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AN INSTRUMENT TO ASSESS SENSORI-MOTOR PLAY OF PRE-SCHOOL TRAINABLE MENTALLY RETARDED CHILDREN

©

by
ALAN NOBLE

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to The Faculty of Graduate Studies and Research for acceptance, a thesis entitled "An Instrument to Assess Sensori-Motor Play of Pre-School Trainable Mentally Retarded Children" submitted by Alan Noble in partial fulfilment of the requirements for the degree of Master of Arts.

Supervisor

DATE June 20th, 1975

ABSTRACT

During recent years, the contribution of the child's play to his total development has received wider recognition. No longer is play regarded as a simple "time-filler" for the pre-school child, until the "serious business" of formal education begins at age six years. Play is an important educational process, providing the child with the opportunity to acquire understanding of the environment in which he lives and of his own competencies and inadequacies.

If play is important to development, concern should be felt for those children who do not play, and for those whose play behavior is so simple, so chaotic or so limited in range that they do not appear to be profiting from their play experiences. Such children are often encountered among mentally retarded groups.

This study involved the development and demonstration of an observational instrument to assess the sensori-motor play of pre-school trainable mentally retarded children.

Using videotaping procedures, the instrument attempted to assess how a child spends his play-time in terms of the quantity and quality of his play. The five qualitative categories of behavior included non-play and four hierarchical levels of play. The levels relate to the six sequential stages of sensori-motor development described by Piaget. Quantitatively, the instrument measures how the child distributes his play-time between the five categories of behavior.

Suggestions were made for graphically representing the stream of play behavior during the 100 second observational periods. Means for

expressing data from play observations were also presented.

An integral part of the study involved obtaining information on intra-subject variability as a basis for validating the instrument. Validity was tested by comparing data from the instrument with the play assessments obtained from seven judges assisting with the conduct of the program in which the subjects were involved. The mean correlation coefficient obtained was $r = .70$.

Tests for intra--and inter-observer reliability were conducted using videotaped recordings of 48 fifty second samples of the subjects' play behavior. Intra-observer reliability was found to be $r = .99$, and inter-observer reliability $r = .98$.

Information was presented on the subjects' play behaviors. The subjects' play indices obtained from the instrument ranged 48.5 to 223.7. The mean was found to be 146 and the standard deviation was 48.

It was concluded that the instrument provided a sensitive, reliable and valid means for assessing the sensori-motor play of trainable mentally retarded children.

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CHAPTER I

STATEMENT OF THE PROBLEM

INTRODUCTION

Play is considered to be a most natural learning process, through which the child explores the structures of the environment in which he lives, and comes to know the forces acting within it. In the same process, he develops a basic understanding of his own competence which is rooted in the knowledge of his capacity to affect change in his environment and which is fundamental to the development of his self esteem. Michelman (1971) expressed these ideas as follows:

> Play is an essential element of human behavior. It is also the most vital activity of childhood. No other activity enables the child to acquire a similar sense of mastery and competence over himself as well as his human and non human environment. (p. 285)

Human play is an enigma, however. It is such a common phenomenon: everybody has experienced the energy, the satisfaction and the fun it generates. Usually, it is easily distinguishable from other behaviors, even when the same physical actions are involved (as for example in romping and fighting). And yet, so little is known about it! Evidence of this is seen when present definitions, explanations or theories of play are examined--considerable controversy exists.

No doubt, this is due more than anything else to the fact that human play does not refer to one, but to a great many different behaviors, as is seen, for example, when we speak of a baby "playing" with a

rattle, some six year olds "playing" "Mothers and Fathers," or some boys "playing" football. Further evidence of the diffuse nature of play is seen in the fact that The Shorter Oxford English Dictionary (1964) found it necessary to give more than 15 meanings of the word "play" as a noun, and 35 meanings as a verb. Slobin (1964) wrote:

> . . . when we examine a set of behaviors as outstanding as that of play, we find ourselves face to face with hundreds of years of attempts to understand human behavior. (p. 61)

While the literature indicates a variety of interpretations of play, there are no doubts as to its significance in contributing to human development. Scarfe (1963), wrote of play as having ". . . all the characteristics of a fine and complete educational process." (p. 119) Scarfe would gain support from most modern students of play. Meier (1968), for example, described it as "a way to know," Ebbeck and Ebbeck (1974) as "a therapeutic agent," as a "socializer" and as "an agent for cognitive development." Weiniger (1973) referred to play as a "vehicle for learning" and . . . "not the simple time filler it was once considered to be." (p. 64), while Stallibrass (1974) suggested that play ". . . can be the means whereby children develop their basically human potentials. . . ." (p. 18) White (1971) wrote of play as having ". . . the basic functions of developing competence in dealing with the environment." (p. 271)

The casual observer of children at play frequently gains a global impression of mass involvement and intensive activity. Close observation however, may reveal vast individual differences in both the quantity and the quality of the play activity. In terms of quantity, for example, a child may spend an undue proportion of his time daydreaming, or perhaps

gaining vicarious enjoyment from the play of others. By contrast, another child may seem to be highly active. A more elusive property of play is the quality or sophistication of the child's interaction with the objects in the environment. Objects, including the child's own body, may be used in a simple or complex manner. To illustrate, an infant of six months may hold a toy block and mouth it: a few months later he may repeatedly bang it on the table: still later he may throw it from his high chair, for just as long as his mother is prepared to replace it: later again, he may use it with other blocks to construct towers of gradually increasing height and complexity. Perhaps, at about age two, he may use the same block symbolically as a car or ship. The sequence is a hierarchical one, indicating the slow emergence of higher levels of interaction with the toy.

This study considers the play of mentally retarded children.

Kuiper (1967) reported:

> The very severe mentally subnormal child hardly plays. There is a big difference in play not only in quantity but also in quality between the play of the normal child and the very severe mentally subnormal child. His play is very simple. . . . A great deal of his play-activities are taken up with his own body. (p. 64)

Takata (1971) made similar observations of handicapped children:

> . . . play is (often) nonspontaneous, in a state of regression, or in a state of very fragile existence. (p. 284)

Newcomer and Morrison (1974) pointed out that:

> . . . retarded children frequently have deficiencies that make play difficult. (p. 727)

Certainly, the play behavior of a group of mentally retarded children appears to be different from that of normal children of the same

age, and tends to reveal a far wider range of within-group differences. Indeed, it could be said that a relatively large proportion of retarded children display what are best described as pathological play patterns.

To illustrate these points reference is made to two studies. In her study of free play among normal nursery school children, Rosenthal (1973), observed a mean of 3 minutes "idle time" per hour, and 20 activity changes per hour. However, in a preliminary study with pre-school trainable mental retardates (using a different play setting from Rosenthal's), the investigator found idle time to be much greater, approaching 80% in one case. Also in contrast to Rosenthal, the investigator noted that another child was always extremely busy, interacting with objects at the rate of one every 15 seconds during the observation period, but seemingly gaining little from each exchange. Yet another bizzare play pattern was seen in the case of the retarded child who perseverated over extended periods using the one play object in the same simple way: in this case, randomly swinging a plastic hockey stick.

The question raised by these observations is that if children normally learn so much through play, as the literature strongly suggests, how much retardation is a direct outcome of unsatisfactory play habits? Could it be that the inadequacies seen in the school-age mentally retarded child are significantly due to the cumulative effects of many years of inadequate play? The available evidence on these questions will be considered in Chapter II.

Undoubtedly, the solution to these kinds of questions lies in the development of an adequate instrument with which to assess play. This study attempted, in a limited way, to produce such an instrument. In doing so, it entered a field described by Feitelson and Ross (1973) as

one of poorly defined and elusive constructs, (p. 217) which has largely been ignored by behavioral researchers. An important reason for doing the study was to examine more closely certain qualitative aspects of the physical behavior of mentally retarded children.

PROBLEM

The present research investigated the development of a valid and reliable instrument for assessing the sensori-motor play behavior of pre-school trainable mentally retarded children.

1. Validity

Validity of the instrument was based on the fact that the chosen categories of qualitative play were related to the six hierarchically developed stages of sensori-motor behavior first described by Piaget (1953). These have been widely recognised in subsequent literature. The quantitative component of the instrument's readings, requiring the timing of the subjects' involvement in various play activities, obviously had a high degree of validity.

It was assumed that the teachers and assistants involved in teaching the subjects used in this study knew them well enough to accurately assess their play behavior. These assessments were compared with play indices obtained from the instrument, in order to provide further evidence of the instrument's validity.

2. Reliability

The instrument was tested for intra-and inter-observer reliability.

The following hypothesis were suggested:

a. There would be close agreement between play assessment scores of the

judges and indices obtained from the instrument.

b. Replicated assessment of the same behavior by an observer trained in the use of the instrument would result in a high level of intra-observer reliability.

c. Assessments of the same behavior by two or more observers trained in the use of the instrument would result in a high level of inter-observer reliability.

SUB-PROBLEM

A sub-problem involved examining means for observing, recording and graphically presenting data on the play behavior of the subjects.

JUSTIFICATION OF THE STUDY

Mittler (1973) wrote:

> The need for alternative approaches to assessment springs on the one hand from the failure of the intelligence test to provide information which can be positively harnessed to the design of a programme of education or habilitation, but also arises from the need for assessment techniques which allow for an idiocratic approach to the wide individual differences found within mentally handicapped populations. (p. 12)

It was considered that the instrument would provide the kind of information on trainable mental retardates which Mittler would regard as valuable.

To examine this point further, Clarke and Clarke (1973) indicated that assessment has four main functions, three of which have direct implications for this study. These are:

1. "To describe the individual as he is at a particular point in time. . . ." (p. 23)

It was considered that the instrument would provide information on how

the child is currently coping with the normal play environment in which he spends much of his time, and the extent to which he is ". . . engaging on (his) own in those kinds of behavior deemed especially conducive to (his) future development." (Feitelson and Ross 1973, p. 221).

2. "To provide a behavioural profile of assets and deficits as a starting point for remedial programmes." (p. 23)

Frank (1957) believed that . . . "when a child cannot play, we should be as troubled as when he refuses to eat or sleep." (p. viii). Feitelson and Ross (1973) cited a number of studies which suggest that play therapy is required when thematic play does not emerge naturally. These stress the learned aspects of such play and the need for modelling. Some mental retardates would seem to require therapy to learn how to sensori-motor play. It was considered that the instrument would assist in identifying these children and point clearly to the kind of therapy required.

3. "To provide an objective means of checking progress of an individual. . . ." (p. 23)

Regular application of an effective instrument would give objective information on the developing play behavior of the child. As such, it could be argued from the writings of Piaget (1951), Hunt (1961), Woodward (1959) and others, that valuable inferences could be drawn regarding the child's cognitive development.

LIMITATIONS AND DELIMITATIONS

LIMITATIONS

1. Data from the instrument must be regarded as being specific to the play setting in which it was obtained.

2. The study produced an instrument which provided information on only

some aspects of sensori-motor play.

DELIMITATIONS

1. The instrument was developed from observations of 16 subjects. Hence, this sample may not represent the population of retarded children of comparable age.

2. Some facets of play, such as territorial range, social and anti-social actions, specific play objects used and activity rate within a particular action unit, were not measured by the instrument. However, the measures chosen were considered to be the most decisive indicators of the play of these subjects.

3. Only limited observations were made on each subject. Observations ceased when the addition of data from a new observation made no significant difference to the mean scores previously accumulated.

DEFINITION OF TERMS

1. Sensori-motor period of development: The pre-symbolic period of human development during which intellectual structures develop through motor behavior and sensory input.

2. Play: intrinsically motivated action on human and non-human objects.

3. Play observation: a sequence of non-play behavior and action units recorded during a 100 second observation of free play.

4. Play setting: the free play area used for the study, including the objects available for play.

5. Action unit: the child's focusing of attention on a particular kind of play, with respect to a particular play object(s). Note: this encompassed not only involvement in the activity, but also certain non-play behavior such as waiting for a turn. The important feature was that the

focus of attention was on a particular kind of activity. The action unit began with physical involvement in the activity, and ended with a shift of attention.

CHAPTER II

REVIEW OF THE LITERATURE

THE PLAY PHENOMENON

Play is a difficult phenomenon to understand. There appears to be no general consensus as to what it is and so it is hardly surprising that most of the theories of play account for only some play behavior. Much of the confusion for the reader of play literature stems from this: the term "play" is used by different writers to denote different types of behavior. For example, while Cass (1971) wrote:

> Children's play involves the solving of problems and the making of decisions. . . . (p. 70)

and Reilly (1974) has recently published a text, "Play as Exploratory Learning," Sutton-Smith (1970) indicated that both he and Piaget would not consider this kind of activity to be play. He wrote:

> We must thank the Genevan psychologist Piaget for (teaching us) that much of what we had called play is really the activity of intelligence. . . . When the child is actively exploring his world, that should not be called play either. (p. 1)

Stallibrass (1974) indicated the difficulties she had in matching her views of play with those of Piaget:

> . . . for instance, he contrasts 'play' with imitation and sometimes--when describing the activity of children over about eighteen months--with learning activity. (p. 117)

This is not to suggest that any of the writings of the authors mentioned above lack internal consistency: it simply points to the difficulties

associated with understanding the play literature.

The wide range of definitions and theories of play which have been proposed over the years have been closely examined by Ellis (1973). From them he proposed:

> The most satisfying explanation of play seems to involve an integration of three: play as arousal-seeking, play as learning, and the developmentalist view of the child. (p. 119)

Briefly stated, this suggests that man has inherited a predisposition to find pleasure in emitting new responses and could be described as a stimulus-seeking organism. Not content to rest (as would say a snake) once his basic biological needs have been satisfied, man continually probes his environment for a stimulus which will produce a movement of his arousal state to an optimal level for him. As the result of the pleasure which comes from his exchange with stimuli, this stimulus-seeking kind of activity is learned and becomes part of his play repertoire.

This explanation accounts for much of the dynamics and educational value of play. As a biproduct of his intimate interaction within the play situation, there is a great flow of information to the player. But in the same process, the play situation itself becomes less novel, less dissonant or less complex. Therefore, the player must regularly seek out new means of optimizing his arousal (eg. by finding new ways to play with things). If he is unable to do this, he becomes bored and will leave that play situation to seek another.

Considering now the educational significance of play, the views of two leading authorities on play seem to summarize the very broad range of highly positive statements found in the literature. Frank (1957)

wrote:

> Play, as we are beginning to understand, is the way the child learns what no one can teach him. It is the way he explores and orientates himself to the actual world of space and time, of things, animals, structures, and people. Through play he learns to live in our symbolic world of meanings and values, of progresssive striving for deferred goals, at the same time exploring and experimenting and learning in his own individualized way. Through play the child practices and rehearses endlessly the complicated and subtle patterns of human living and communication which he must master if he is to become a participating adult in our social life. (p. vii)

Scarfe (1963) wrote:

> A child's play is his way of exploring and experimenting while he builds up relations with the world and with himself. In play he is learning to learn. (p. 119)

Later he added:

> Play has, in fact, all the characteristics of a fine and complete educational process. It secures concentration for a great length of time. It develops initiative, imagination and intense interest. There is tremendous intellectual ferment, as well as complete emotional involvement. No other activity motivates repetition more thoroughly. No other activity improves the personality so markedly. No other activity calls so fully on the resources of effort and energy which lie latent in the human being. Play is the most complete of all educational processes for it influences the intellect, the emotions and the body of the child. It is the only activity in which the whole educational process is fully consummated, when experience induces learning and learning produces wisdom and character. (p. 119)

This brief examination of the play phenomenon, and in particular, its educational significance is intended as a basis for the following review of the literature on the play behavior of mentally retarded children. Other sections of this literature review consider the classification and assessment of play and the characteristics of observational instruments.

THE PLAY OF MENTALLY RETARDED CHILDREN

Introduction

The literature indicates that the play of mental retardates is quantitatively and qualitatively inferior to that of normal children.

In a discussion of the behavior of retarded infants, Illingworth (1972) referred to the excessive inactivity observed. In outlining the criteria used to clinically diagnose moderate to severe mental subnormality during the first few weeks after birth, he wrote:

> He (the retardate) is relatively more retarded in the amount of interest which he shows in his surroundings, in concentration, alertness, and promptness of response. . . . The excessive tendency to sleep may persist for several months. (p. 287)

Some of his recorded statements of mothers of retarded children are illuminating. For example:

> "He didn't move much when a baby. He didn't seem to live until he was 8 months old."
>
> "He just lay in his pram without moving for 6 months. He used to sleep nearly all the time."
>
> "He was like a cabbage for the first 2 years. He would just sit in his pram."
>
> "He was a very good baby, and no trouble at all; his brother was a lot more trouble." (The older brother was normal). (p. 288)

In tracing the developmental history of the retardate, Illingworth stressed:

> There is a notable lack of interest in surroundings.
>
> There is a fleeting interest in toys or else he does not seem to notice them at all. If given a toy . . . it does not hold his attention. (pp. 287, 288)

Francis (1970) provided further evidence that the kind of diag-

nostic attributes described by Illingworth persist into the retardate's later years. The subjects for her study were 112 low grade mongoloids ranging in age up to 57 years. Francis noted the occurrence of certain kinds of behaviors as a function of age. She observed:

> The behavior of severely retarded individuals, like that of an infant consists largely of simple physical activities which are limited in range, variability, and speed of performance, and are frequently repeated. (p. 93)

Knox (1968) observed the natural play behavior of 12 four year old mentally retarded children. She noted an apparent lack of curiosity and concentration. The majority showed little interest in new experiences or new toys. A most significant observation was the lack of imaginative and dramatic play: these are conspicuous in the play of normal four year olds. Other features were the great amount of time spent in watching others play, a lower level of participation in parallel play than would be expected of normal children of this age, and relative passivity when toys were snatched or grabbed by others.

Whitaker (1972) studied the effects of a therapeutic recreational program on the free play patterns of mentally retarded boys aged nine to nineteen years. The free play behavior was described as ". . . languishing in idleness, abusing equipment, just passive or generally unproductive." (p. 2)

In a study comparing the play behavior of 10 multihandicapped with 11 nonhandicapped children 31 to 58 months old, Gralewicz (1973) found that the handicapped children had significantly less play time. The mean total play time for the nonhandicapped was 480 minutes per day, as compared with 350 minutes for the handicapped. Also, she found that nonhandicapped children had significantly more play-fellows and spent over

twice as long per day playing with others as did the handicapped children.

Kuiper (1967) wrote:

> The very severe mentally subnormal child hardly plays. There is a big difference in play not only in quantity but also in quality between the play of the normal child and the very severe mentally subnormal child. His play is very simple. The child often repeats his activity. A great deal of his play activities are taken up with his own body. . . . When handling new and unknown toys, stereotyped actions are used again and again. (pp. 64, 65)

It can be seen from this evidence that there are differences between the play behavior of normal and retarded children in terms of both quantity and quality. Signs of future deficit play behavior are often discernible in the pre-play stage of the retardate's early infancy, suggesting that it may be a direct outcome of his mental impairment. However, it is argued that both inherent and environment factors contribute to the inferior play observed among mental retardates. Evidence relating to possible reasons for play differences will now be considered.

Inherent factors leading to deficit play

Play has been described as intrinsically motivated action on objects in the environment. Piaget (1953) gave many illustrations of the instrinsically motivated activity of his own children. For example, his observation of Laurent at the age of three months, 10 days:

> . . . I placed the string, which is attached to the rattle, in his right hand, merely unrolling it a little so that he may grasp it better. For a moment nothing happens but, at the first shake due to chance movements of his hand, the reaction is immediate: Laurent starts when looking at the rattle and then violently strikes his right hand alone, as if he felt the resistance and the effect. The operation lasts fully a quarter of an hour during which Laurent emits peels of laughter. The phenomenon is all the more clear because, the string being slack, the child must stretch his arm sufficiently and put the right amount of effort into it. (p. 162)

The circular chain of response patterns is the most significant feature

of this simple play episode. Actions and reactions are integrated into a meaningful sequence, the end of one sequence being the cue for its repetition. Glencross (1973) wrote:

> . . . a large proportion of the infants play activity is concerned with trying to recognise and reproduce patterns of sensation and hence patterns of movement. (p. 2)

According to White (1973), the motivating factor in such play activity is "a feeling of efficacy" or deep satisfaction from being able to affect the environment. He said that in much of what we call play, children are ". . . trying out their own powers to make things happen." (p. 273)

Considering now the play of mental retardates, it can be seen that the inherent deficiencies of these children reported by Illingworth would effectively block the development of circular play sequences which normally form a substantial proportion of total play activity for infants. The chances of a 3 month old retarded infant enjoying the kind of play experience described by Piaget would be very remote indeed. According to Illingworth, there would be little chance of him producing "chance movements," because of his inertness and tendency to sleep excessively. But if a movement <u>did</u> occur and a noise resulted, there would be little chance of a retardate responding to either the noise or the movement of the rattle, because of his lack of interest in his surroundings. Also, if the striking of the right hand were repeated, it would be unlikely to be sustained because of his limited attention span. Involvement in this simple play episode, which obviously brought great delight to Laurent, would hardly be likely to do the same for a mentally retarded child.

Some support for this explanation comes from Florey (1971), who

suggested that "constitutional factors may affect the degree to which a child is able to experience feelings of satisfaction as a result of his active efforts." (p. 277). She cited White (1963) as stating that "this could be the case if activity level were low and effort uncomfortable, or if coordination were poor so that the effects produced on the environment were not regular and repeatable."

Michelman (1974) wrote:

> Unlike the healthy child, he (the deficit child) cannot be stimulated by sight, sound and smell and thus discover pleasure in his own body movements.. The preconditions for sensory motor play or practice games are blocked. The pleasurable exercise of such rudimentary skills as banging, shaking, learning to roll over or creep do not generalize through the sheer enjoyment of the activity itself. Repetition does not lead to learning and random action does not result in understanding cause and effect. (pp. 160, 161)

To summarize, the evidence presented indicates the importance of inherent factors as contributing towards the low degree of play involvement among mentally retarded children. Left to themselves, without intervention, play time is far less likely to be used for play by mental retardates than by normal children.

Inherent factors are also considered to be important in explaining the limited emergence of <u>quality</u> play among mentally retarded children. To understand the term "quality" when it is applied to play, some knowledge is required of the hierarchical-stage model of human development, of which Piaget was the principle architect. The essential features of this model have been described by Sergiovanni and Elliott (1975) and are summarized as follows:

1. Development proceeds through distinct hierarchical or qualitative stages which occur in invariant order.

2. Each stage is a pre-requisite for, and is subsumed by the next higher stage. However, behaviors associated with a lower stage may reappear under certain conditions: certainly, the individual does not operate at his upper level all the time.

3. Development does not necessarily proceed to the higher stages. Although obviously based in inherent factors, the limits and rate of development are affected by environmental factors.

Originally, Piaget used this model to explain cognitive development, but because he considered that play behavior reflects the growth of the child's mental structures, it follows that play development also conforms to the model. The relationship between cognitive and play development is best understood from the writings of Ellis (1973):

> . . . children play (or behave) in certain ways because that kind of behavior is determined by the structure of the thinking or cognitive processes of the child. The structure of the thinking is presumed to be inherited.
>
> . . . Play takes place in the mind, with the body involved in process as a producer of effects or inputs for further thinking. (p. 64)

Thus Piaget's first stages of cognitive development, incorporating three different forms of intelligence (viz. sensori-motor; representational; and concrete operations), correspond respectively with his three stages of play development. These are:

1. practice games, which normally predominate from the age of 2 months to 2 years,
2. symbolic games, 2 years to 7 years, and
3. games with rules, 7 years to 11 years.

Weininger (1973) interpreted Piaget as follows:

> Play embodies and signifies certain essentials in human mental and intellectual growth; by watching a child play we see at what level

> he is currently most able to function in terms of the continuum of development from sensorimotor to full use of symbolic and finally verbal, reflective, intellectual processes. (p. 66)

It could be argued that the evidence presented establishes clearly the inherent reasons for the low quality of play observed among mental retardates. By definition, retardates have limited cognition and so it could be expected that there would be a correspondingly limited play quality. However, this assumes that retardates conform to the same model of development as normal children. Evidence that this is so comes from Woodward (1959) who studied the sensori-motor behavior of 147 severely mentally retarded children up to the age of 16 years. She observed that many of their mannerisms and much of their seemingly purposeless behavior are no more than the abnormally late persistence of the actions of normal infants up to 2 years old. The detailed enquiry concluded that:

> sensori-motor responses, ranked in the order in which mental defectives show them, in decreasing order of frequency, agree closely with those observed by Piaget to appear in normal infants at successive ages. Furthermore, most of the idiots showing the responses of Piaget's later stages also exhibited those of earlier stages. This suggests that the sensori-motor development of severe mental defectives follows the same sequence described by Piaget. (p. 70)

The significance of the evidence presented may be summarized as follows:

1. Cognitive development is rooted primarily in inherent factors.
2. Qualitative limits of play are set by cognitive structures.
3. Retardates follow the normal sequence of maturation, but at a slower rate than for the normal child. Therefore, it may be concluded that the low quality of play reported among mentally retarded children is likely to be related to inherent factors.

Environmental factors leading to deficit play

Consideration has been given to the inherent factors which result in mental retardates making less use of their play time for play activities than normal children. It is now suggested that environmental factors also limit play participation for these children.

Most of the literature on this topic indicates that retardates are play-deprived. For example, Austin (1969) wrote:

> . . . play is . . . a fundamental human right of every individual although it appears that we have denied this right to the mentally retarded. (p. 14)

Benoit (1955) considered:

> . . . it is undeniable that retarded children . . . have less than their fair measure of play. (p. 42)

Zigler (1967) indicated that many of the reported behavioral differences between normal and retarded groups, even normals and retardates of the same mental age, reflect a myriad of environmental influences which adversely affect the development of the retardate. He wrote:

> . . . many of the reported behavioral differences between normals and retardates of the same mental age are seen as products of motivational and experiential differences between these groups, rather than as the result of an inherent cognitive deficiency in the retardates. (p. 298)

Ross (1969) used this viewpoint to explain why retardates play less than normal children. She wrote:

> They have restricted early play experience, seldom attend nursery or pre-schools, and are subject to extreme adult surveillance. They usually attend school outside the neighbourhood, a further restriction on play with neighbourhood peers. (p. 912)

to which she later added:

> Because of preconceptions about the children's abilities, parents and teachers tend to limit demands that are made, anticipate consequences, and protect the children from the results of many of their actions. (p. 912)

Ross (1970) discussed the "failure--expectancy of failure--performance failure" syndrome as a limitation to the play of retardates. She illustrated her argument with the remarks from some retarded children:

> "I never can play and then the other kids don't like it."
>
> "I always do so bad I spoil the game and Billy (brother) says why does he always have to play with me."
>
> "Games are too hard. I like to watch and hold the money." (p. 724)

Takata (1971) saw four environmental influences on play. These are human, non-human, qualitative and quantitative aspects. She interviewed parents of multihandicapped children to determine the presence, absence or limitation of these four conditions. Takata found evidence of play deprivation: that is, a high involvement in sedentary, passive experiences (usually television), limited play materials, lack of appropriate models and too high or too low parental expectation. However, the criteria for these judgements were not stated.

In his consideration of the reasons for low play involvement by retarded children, Benoit (1955) mentioned the lack of literature and the general misunderstanding of how to stimulate such children in play. Play materials suited to the interests of retarded children are often unsafe, because they were designed for younger children with less strength. Benoit noted the prevailing . . . "attitude of hopelessness towards the teaching of play activities to retarded children." (p. 44). In training institutions, limitations on play development seen by Benoit included insufficient staff, inadequate facilities, scarcity of play equipment,

and the need, expressed by staff, to keep activity level low to prevent accidents. ("Big bodies governed by little minds can be very unwieldy" p. 45). Like Ross, Benoit considered that those who work with retardates are too accident conscious. He suggested that these children lack initiative and aggressiveness because they are over protected in play. He wrote:

> Clearly, retarded children are cheated when they are over protected. (p. 47)

Benoit also referred to the amount of time institutionalized retardates spend ". . . in the abnormal condition of remaining seated and quiet." (p. 74)

White's (1971) views on competence and self esteem seem highly relevant to the play of retarded children. In his view, much of children's play is concerned with developing competence. He discussed the importance of social rewards in fostering play behavior. He wrote:

> In many situations, of course, social rewards are added to those arising from one's sense of competence. When one intends to influence other people the human response is the proof of one's efficacy or inefficacy. (p. 273)

White felt that self esteem is based in competence:

> Level of self esteem depends upon one's confidence based on experience, that one can make desired things happen, together with an appreciative recognition of this competence by others. (p. 273)

The implications of White's thinking to the play of retardates may be seen in the following passage from Michelman (1974):

> Launched on the right trajectory, the child is likely to accumulate successes that strengthen the effectiveness of his orientation to the world while at the same time he acquires the knowledge and skills that make his further success more probable. His environ-

> mental involvements generally lead to gratification and to increased competence and favourable development.

She then referred to the "vicious cycle of incompetence":

> Off to a bad start, on the other hand, he soon encounters failures that make him hesitant to try. What to others are challenges appear to him as threats; he becomes preoccupied with defense of his small claims on life at the expense of energies to invest in constructive coping. And he falls increasingly behind his fellows in acquiring the knowledge and skills that are needed for success on those occasions when he does try. (pp. 164, 165)

In summary, evidence from the literature suggests that excessive environmental restrictions are placed on the play engaged in by mentally retarded children. However, most of this evidence appears to be opinion, based on subjective observations. The restrictions described could be considered as ranging from ignorance on the part of those people (adults and children) who have dealings with retardates, through circumstances which cannot be controlled, to downright inhuman neglect.

OBSERVATIONAL RESEARCH METHODOLOGY; CLASSIFICATION AND ASSESSMENT OF PLAY

Observational Research Methodology

The observation of human behavior in a natural setting is an important form of basic research. Connolly (1973) referred to ". . . the resurgence of interest in the direct observation of behaviour," (p. 219) after a period of some forty years during which empirical studies claimed the attention of researchers. He pointed to the need for a balance between empirical and observational studies in the development of an understanding of behavior.

Observational research is based on use of a system, or instrument, through which the various dimensions of the phenomena under consideration may be categorized.

Observational instruments have been investigated by Simon and Boyer (1974), Robbins (1973), French (1959), Connolly (1973) and Rosenthal (1973). The pertinent points made were:

1. The researcher should establish a rational theoretical framework for the categories of behavior to be recorded. (Connolly).

2. Ideally, an instrument should represent . . . "sets of mutually exclusive, all inclusive behaviors." (Simon and Boyer, p. 11). This means that in observations of a stream of behavior, there is a category for every behavior seen, and every behavior fits only one category.

3. With due consideration for brevity, (in view of problems associated with training observers in the use of the instrument) each category must be clearly and objectively defined. Connolly wrote:

> "When the observer has to frequently make judgements regarding whether a given behaviour belongs to a certain category then it is inevitable that intra--and inter-individual consistency will be reduced." (p. 226)

4. A compromise must be reached between a) a large number of categories, making for fine distinctions between observed behaviors, but creating difficulties for the training of observers, and b) a small number of categories, tending to make the instrument easy to learn but at the same time decreasing the definition of the categories. Connolly suggested:

> ". . . the reliability of the data tends to vary inversely with the number of categories to be distinguished and independently noted." (p. 226)

5. In time sampling procedures, French (1959) wrote:

> "There has been some evidence presented favoring an accumulation of a large number of very brief observations over a few continuous observations, but . . . logic should be used in setting up the study, with the purpose kept clearly in mind." (pp. 104, 105)

The length and frequency of observations should be sufficient to reveal the facts and for a reasonably stable ratio to be established between the various categories.

6. The use of video-tape recording was considered by Rosenthal (1973), Connolly (1973) and Robbins (1973). Rosenthal described video-taping as providing a . . . "complete and multi-variable picture of molar and overt behavior and situation" . . . (p. 39). The advantages include

a.) scope for repeated observations

b.) ease of training observers

c.) ease of testing inter--and intra-observer reliability

d.) the tapes provide a permanent means of storing information, from which other detail may be obtained later.

The main disadvantages relate to carrying and operating the camera, the limited field of vision of the camera and the possible distracting effect of the presence of the operator and the equipment in the observational area.

Classification and Assessment of Play

Several attempts have been made to develop instruments for the classification and assessment of play.

Florey (1971) attempted to establish a format for many of the kinds of play activities children engage in from birth to 11 years. Human objects were considered as parents, peers and self, while non-human objects were also given 3 categories:

Type I: Creative or unstructured plastic materials such as paints, water, sand and clay.

Type II: objects which change shape when arranged in different ways, for

example wooden blocks, beads.

Type III: objects such as dolls and balls which do not change when manipulated.

Florey prepared charts including the various ways the child acts on the human and non-human objects in his environment as he develops. She considered that this model would provide a useful perspective from which to study play.

Takata (1974) described the diagnostic-prescriptive model of play she uses in her role as an occupational therapist. The diagnosis is determined from answers to a wide range of questions asked with respect to the child's play history and present play patterns. For example, how did the child play when he was 12 months old? Was he noisy, active, etc.? Did he play with many or few toys? Does the child play with many or a few peers? What is his normal posture during play? eg. Does he spend a large proportion of his play in sedentary activities? How long does the child play? From the information received Takata felt that play behavior could be diagnosed and suitable play activities prescribed.

Whitaker (1972) studied the effects of a therapeutic recreation program on the responses of a group of ten institutionalized male mental retardates (ages 9 to 19: I.Q.'s 20 to 50) to 16 different play objects--blocks, car, puzzle, hammer and pounding bench etc. A similar group of retardates acted as a control group. Whitaker devised an observational instrument to assess the play activity. This had 14 categories: combination, imaginative, transportation, structural, manipulative, auditory, creative, inspection, non-interactive, repetitive, oral, random, destructive and inactivity. Two observations of 10 minutes were made of

each subject. Data collected included the toy selected, time spent performing specific acts, time spent in the activity categories and frequency with which the activity categories occurred.

Knox (1968, 1974) presented a model for observing and assessing play behavior, her particular interest being the play of mentally retarded children. She wrote (1974):

> When the observation is structured the information may be collected systematically and any planned intervention becomes more predictable and measurable. (p. 247)

From the play literature, Knox formulated a scale of the year by year play development of normal children. Behaviors were categorized under four headings:

1. Space management: the way a child explores and experiments in the use of his body and the space about him.
2. Material management: the manner in which materials are used.
3. Imitation: the way the child gains an understanding of the social world in which he lives.
4. Participation: the amount and manner of interaction with other persons and the degree of independence demonstrated.

Knox used these play scale to determine a "play age" for 12 pre-school mentally retarded subjects who were observed four or more times for periods of 15 to 30 minutes each. Play behaviors were compared with those on the developmental scale. If, for example, a subject displayed space management behaviors of a normal two year old, he was rated at 2. The mean rating from all four categories was regarded as the subject's play age.

None of the instruments described above appeared to effectively

combine ALL the criteria presented in the previous section on observational instrumentation, and at the same time capture the quantitative and qualitative components of the play of the subjects used in this study. To obtain a suitable instrument, the investigator combined and modified two other methods which were used to describe and classify play behavior. These methods were proposed by Rosenthal (1972) and Piaget (1953).

In an ecological study of nursery school children, Rosenthal used videotaping procedures to obtain data on their play behavior. For her, play behavior was considered to be a series of action units during which the child's attention was directed towards a specific activity. These action units were of varying length, sometimes interspersed with periods of idleness. Rosenthal's data included the length of the action units observed together with the idle time. The present instrument uses this basic technique to obtain quantitative data, but it also attempts to qualitatively categorize the action units. The qualitative aspects of the instrument were derived from Piaget's theory dealing with the hierarchical development of sensori-motor behaviors to which reference has been made. The relationship between Piaget's six sequential stages and the instrument's levels of play is set out in Chapter III.

CHAPTER III

METHODS AND PROCEDURES

INTRODUCTION

This study involved the development and demonstration of an instrument to assess the sensori-motor behavior of pre-school trainable mentally retarded children during their free play periods.

The use of the instrument was demonstrated in obtaining a representative sample of the subjects' behavior. This was done through repeated systematic observations during free play periods. Observations were continued to the point where the addition of new data made no significant difference to the means of the accumulated data.

The validity of the instrument was rooted in the fact that it was derived from the literature. However, validity was tested by comparing play indices obtained from the instrument with play assessments made by seven judges who had worked with the subjects in various ways.

The instrument was also tested for intra--and inter-observer reliability.

THE INSTRUMENT

Quantitative aspects of the instrument were derived from a study by Rosenthal (1972). She viewed pre-school children's play as being a series of action units interspersed with occasional periods of idle time. An action unit is a period during which the child indulges in a particular play activity. Quantitatively, the instrument required the defini-

tion and timing of both the action units and the periods of idleness throughout the observed stream of behavior.

The instrument's qualitative components were derived from Piaget's (1953) theory of the sequential emergence of sensori-motor behaviors in normal infants under two years. Woodward (1959) showed that much of the behavior of severely retarded youngsters ranging in age from 7 months to 16 years, but of mental ages less than 2 years, was no more than abnormally late manifestation of behaviors which occur in the sensori-motor period of normal children. She confirmed that Piaget's postulated order of emergence of responses was to be found in these children, just as Piaget had found it in normal infants.

Qualitatively, the instrument required that each action unit be appraised in terms of its level of sophistication of sensori-motor play behavior. However, while Piaget described six stages of sensori-motor development, the instrument has only five hierarchical categories or levels. The differences result from an attempt to make categorization of behavior as simple and as objective as possible. The relationship between Piaget's stages and the instrument's levels are described as follows:

1. Piaget's Stages 1 and 2 were regarded, by definition and interpretation, as non-play.

2. The instrument's Level I play involved the simplest actions on objects eg. holding, walking. Such actions were not categorized by Piaget into a sensori-motor stage. There were four reasons for including this category: first, by definition this was play; second, some subjects spent much of their time engaged in this way; third, this kind

of behavior indicates an advance over the gross unresponsiveness sometimes seen among severe mental retardates; and fourth, this category was seen to sharpen the sensitivity of the instrument in the lower levels of sensori-motor play.

3. Criteria for the instrument's Level II were considered to approximate Piaget's Stages 3 and 4 i.e. the secondary circular reactions and the intentional coordination of these in different ways.

4. The instrument's Level III approximated Piaget's Stage 5 and the action on objects he described for Stage 6.

5. The instrument's Level IV covered the symbolic actions described for Piaget's Stage 6.

Note: No significant change was suggested in the hierarchy of sensori-motor behaviors described by Piaget. Further details on these stages may be obtained from Hunt (1961).

Therefore, the instrument's categories related to Piaget's stages as follows:

Piaget	The instrument
stage 1	non-play
stage 2	
	Level I
stage 3	Level II
stage 4	
stage 5	Level III
stage 6	Level IV

THE SUBJECTS

The 16 subjects for this study were all the students from the two

pre-school classes at the Winnifred Stewart School for Trainable Retarded Children. Observations were made during their regular participation in the Pre-school Play Program at the University of Alberta.

Table I indicates the age and sex of the subjects.

TABLE I

AGE AND SEX OF SUBJECTS

Age	Males	Females
3 years	1	
4 years	3	3
5 years	6	1
6 years		1
7 years	1	
TOTAL	11	5

Although most of the subjects had displayed a good level of comprehension of simple instructions, some had very low comprehension. None had progressed far beyond the hollophrastic stage of language development. However, some subjects revealed good command of non-verbal modes of communication; for example, by the use of gestures.

THE PROGRAM

The subjects were engaged in a special program conducted at the University of Alberta for 2 sessions per week, each of 1½ hours. Essentially, the program is designed to validate curriculum materials and teaching strategies for mentally retarded children and to provide clinical experience for students from the Faculty of Physical Education. The program includes structured teaching periods and free play periods. The

observations for this study were obtained from the normal free play periods.

Those assisting with the conduct of the program were staff members and students from the Faculty of Physical Education of the University of Alberta. They could be described as energetic and highly stimulating. The normal staff: subject ratio was approximately 1:3.

THE PLAY FACILITIES

The area used for the program was approximately 250 square yards. Play materials present had been specifically chosen for these children. Items included various toys, physical education equipment (eg. balls, hoops, plastic hockey sticks, bean bags), climbing apparatus, rubber mats, a wooden slide, play boxes, tricycles, scoot-boards. Overall, there were judged to be ample play opportunities and sufficient space. No special precautions were taken by the researcher to manipulate the play materials: these were readily available to the subjects, just as they were in normal play sessions. One exception was a small playhouse which was not available to the subjects due to the videotaping difficulties it presented. Also, a trampoline which required supervision was not used in the study.

PROCEDURES

Videotaping

The play patterns of the subjects were videotaped by the investigator using a Sony $\frac{1}{2}$ inch videotape recorder. Each observation was for 100 seconds. This period was considered to be the most suitable compromise between a large number of short observations and a smaller number of longer observations. As indicated in Chapter II, in observational

studies there are advantages in the former, in that data is more likely to be obtained on the full range of a subject's behaviors. However, in this study, there was also the need to accumulate a substantial volume of observational data to establish representative samples of the subjects' play patterns. A major advantage of the 100 second observation period was that it allowed for easy determination of percentage distribution of time between the five categories of behavior.

The subjects were videotaped in turn according to a predetermined random order which was changed for each subsequent recording. When all subjects were present, this required approximately one half hour. Normally, one recording was taken of each subject every day classes were held, except that when a subject was absent, a second recording was taken during a subsequent class. No more than two observations were taken on any one day.

Staff members were requested not to initiate activity with a subject being videotaped. However, they were to respond normally by cooperating if a subject being observed attempted to involve them in an activity.

Measurements

An audio count of 100 seconds was dubbed onto each observation and the distribution of time between non-play and the four qualitative categories of play was determined. Every 100 second play observation was reduced to a simple histogram: time vs. play level. (See Appendix A). This allowed for ease of totalling time distribution between non-play and the four categories of play; i.e. by simply counting the number of seconds (1/10ths of an inch) on each of the five levels used on the ver-

tical axis to represent the five qualitative categories.

INTERPRETATIONS OF PLAY CATEGORIES*

Introduction

Play has been defined as "intrinsically motivated action on human and non-human objects," but this was not adequate for the purpose of this study. As for Rosenthal (1973), play behavior was considered to be a series of action units interspersed with occasional periods of idle time (or non-play). Action units were distinguished by the child's focus of attention shifting from one kind of play object(s), or one kind of activity, to another. Thus a child waiting for a ball to be returned from a partner was still regarded as playing and was still involved in the one action unit, although by definition he was not playing (i.e. acting on the object) at that time. An action unit began with physical involvement in the activity and ended with a shift of attention.

A child deliberately changing his action on an object was regarded as being involved in two action units (eg. walking with a ball and then throwing it).

An important distinction was drawn between play activities like climbing, sliding and jumping in which the action was on the child's own whole body and introverted actions on the body such as shaking the hands or scratching and rubbing, which were categorized as non-play.

In some instances, the question of whether there was intent in the action was considered important, in differentiating play. For example, a child may have been standing and watching others, but have lost balance and fallen i.e. non-play. As opposed to this, a child may

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*See also Appendix B dealing with the training of observers.

deliberately play at falling down. Also, carrying an object with the intention of doing something with it (Level II play) was distinguished from wandering with an object (Level I play).

Non-play

Non-play included the following: idleness (eg. lying down, staring at the floor); random movements (eg. shaking the hands, squirming); introverted actions on the body (eg. shaking the hands); watching others; toileting; responding to disciplinary action (eg. being told to sit down as the result of a misdemeanour); repetitive, non-functioning, self-stimulating acts (eg. rocking).

Level I play

Level I play included the following: the simplest form of action on objects: holding or carrying an object without intent; randomly swinging or fiddling with an object without appearing to be interested in it; pulling or pushing an object without appearing interested. Also, the simplest locomotor activities: walking; crawling; shuffling on buttocks, hands and feet; using the slide conventionally, feet first in the sitting position; being a "passenger" (eg. on a tricycle), but not contributing to the movement or to steering. Being in a "special" place (eg. in or on a play cube).

Level II play

Level II play included more sophisticated action on objects in which the child attends to action(s) providing sensory feedback. The subject is in contact with the object and produces an effect which interests him (eg. tapping or ganging; pushing or pulling with interest in the effects; handling/fiddling with an object and seeming to be interested, generally

by looking; propelling a tricycle, scoot-board etc.). Throwing without watching the effect. Carrying an object (usually in a straight path-way) with intent (eg. picking up a scoot-board and walking to the slide). Locomotor activities involving first order departure from the simple locomotion of Level I (eg. running, stepping, jumping, walking/crawling on a slope, sliding with variations). Note: In running and jumping the body must be air-borne. Also, swinging/hanging from apparatus, with or without the feet on the ground. Attention to clothing (eg. taking off shoes). Acts of affection (eg. hugging); pushing, pulling or resisting another person.

Level III play

Level III play included the following: action on an object which results in the object being removed from the subject in terms of time or space, but which still interests the subject (eg. hitting a ball and chasing it); i.e. consequences of his actions interest him. Defending an object from another child. Sophisticated locomotion involving high level skill (eg. climbing the apparatus, balance walk up or down a slope). Intensively examining an object involving prodding with the fingers, shaking to hear the effect etc. Building or aligning objects. Putting objects in or taking them out of a container.

Level IV play

Level IV play included the following: symbolic or make-believe activity in which objects change their character under the action of the child's emerging imagination. Thus, a block of wood may become a ship or car, an empty container may be acted upon as though full of liquid. Note: A most difficult behavior to categorize was action upon another

person to obtain a desired goal. For example, pulling another child from a tricycle before getting on to ride it. This was interpreted as sophisticated behavior, in some ways meeting criteria for Level III. However, it was argued that if the desired goal were of a low level, or even non-play (eg. indicating a toiletry need), this action should not be rated high. Action on another person to obtain a removed goal was therefore rated at the level above that of the goal, except in the case of a Level III goal there was no elevation. In the example given, riding the tricycle is at Level II, therefore the action on the other subject is Level III.

STATISTICAL TREATMENT OF DATA

This study involved the development and demonstration of an observational instrument with which to assess the sensori-motor play of preschool trainable mentally retarded children.

1. Presentation of data

Using the instrument, observational histograms were drawn for every 100 second observation. Scores from each observational histogram, and also the accumulated mean scores for every subject, were expressed as follows:

$$A \; \frac{B}{C : D : E : F}$$

Where A is the percentage of time spent in non-play

C is the percentage of time at Level I play

D is the percentage of time at Level II play

E is the percentage of time at Level III play

F is the percentage of time at Level IV play

and B is a play index, computed as

$$1 \times C + 2 \times D + 3 \times E + 4 \times F$$

The play index (B) was considered to have a high degree of validity with respect to the quantity and quality of the subjects' play within the play setting where the observations were made. For example, for a subject to obtain a high 'B' score (eg. over 200), not only would he need to be involved in play activity for the major part of the observation, but also most of his play would have to be of a high qualitative level.

2. Obtaining a representative sample of the subjects' behavior

After every new set of data was derived from a video-recording, it was incorporated into the accumulated data and new means were determined for the time distribution between non-play and the four categories of play. Further observations were deemed unnecessary when it was considered that the recorded observations represented accurately the character of the subjects' play. This was interpreted as being the point at which the addition of new data produced no significant change in distribution of time between the five categories. Statistically, this involved the simple procedure of determining a total discrepancy (T.D.); i.e. the sum of the discrepancies seen within each category between the old and the new means. As the number of observations increased, the accumulated data also increased, and therefore fluctuations in the total of the discrepancies between the means tended to decrease. Observations ceased when the mean of the total discrepancies for the whole group was reduced below the critical value of ten. From that point, it was considered that the input of data from further observations would produce minimal flucations in play indices.

Graphs were drawn to show the progressive fluctuations in a.) the

subjects' play indices, b.) the subjects' total discrepancies in time distribution between the five categories and c.) the group's mean for the total discrepancies in time distribution.

3. Validity

A correlation coefficient was determined between the play index ('B' score) for each subject and the mean play assessment obtained from each of three groups of judges associated with the program, and also the mean assessment of all the judges. See Appendix C, "Play Assessment Instructions." The judges were a.) Two staff from the Faculty of Physical Education of the University of Alberta. b.) Two class teachers who accompanied the subjects from their school and c.) Three senior Physical Education students from the University of Alberta.

4. Intra-observer reliability

The investigator produced data from three 50 second video-taped observations of each subject (i.e. a total of 48 observations), and play indices were determined in every case. This process was repeated after 7 days, using the same video-tapes. A correlation coefficient was calculated for the two sets of indices, and a Spearman-Brown Prophecy Formula was used to calculate a reliability coefficient if the full 100 second observations had been used in this test.

5. Inter-observer reliability

Two of the assistants in the program were trained by the investigator in the use of the instrument. One of these observers was a university staff member and the other a Ph.D. student. Both were from the Faculty of Physical Education of the University of Alberta. The training program consisted of the following:

a. The observers read a manual for training observers. See Appendix B.

b. The investigator and the observers discussed aspects of interpretation.

c. Practice in recording data was given by using one video-taped observation of 100 seconds.

The entire program lasted approximately 30 minutes.

To test inter-observer reliability, the investigator and the two observers each produced data from three 50 second video-taped observations of each subject. (i.e. a total of 48 observations). Play indices were determined for every observation. A correlation coefficient was determined between scores obtained from a.) the investigator and observer 1, b.) the investigator and observer 2, and c.) observer 1 and observer 2. The 'r' obtained in each case was used in a Spearman-Brown Prophecy Formula to determine the reliability coefficients if the full 100 second observations had been used in this test. Finally, 't' tests were applied to each of the three sets of data to determine if the differences between the means of the paired scores were significant.

6. Statistical hypotheses

The following null hypotheses were tested:

(1) There would be no agreement between the subjects' play assessment scores obtained from the judges (i.e. teachers and assistants) and indices obtained from the instrument. That is:

$$H_0 : r = 0$$

$$H_A : r \neq 0$$

(2) The instrument would prove unreliable, as indicated by intra-observer assessments. That is:

$$H_0 : r = 0$$

$$H_A : r \neq 0$$

(3) The instrument would prove unreliable, as indicated by inter-observer assessments. That is:

$$H_0 : r = 0$$

$$H_A : r \neq 0$$

The acceptable level of significance in each case was set at .05.

CHAPTER IV

RESULTS AND DISCUSSION

INTRODUCTION

The present study investigated the development of a valid and reliable instrument with which to assess the sensori-motor play behavior of pre-school trainable mentally retarded children. An instrument was devised from the literature and its use demonstrated by the investigator in obtaining data on the play activities of sixteen retarded subjects.

The first part of this chapter deals with an examination of the instrument with respect to the problem and sub-problem posed in Chapter II. The discussion is developed logically, examining first the kind of play data collected, and how it was used in obtaining a representative sample of the subjects' behavior as a basis for validating the instrument. The validity of an instrument of this kind is usually difficult to establish and so this is considered in detail. The results of tests for validity and reliability are presented and discussed.

An observational instrument may be valid and reliable, but unless it discriminates between the members of a population, it tends to have little value. Hence, although it was not part of the original problem, the sensitivity of the instrument is also discussed.

The sub-problem was concerned, in part, with the observational methodology used in the study. Therefore, the advantages and limitations of the videotaping procedure are also considered in this part of the chapter dealing with the instrument.

The second part of this chapter deals with what may be regarded as an important bi-product of the study: an examination of the subjects' play behavior using data obtained from the instrument.

THE INSTRUMENT

1. Presentation of data

The use of the instrument was demonstrated as follows: video-taped observations were taken of the subjects' behavior during free play periods. From each 100 second observation, the distribution of time between non-play and four hierarchical levels of play was determined. A histogram was drawn of each observation and the data it contained was incorporated with the existing accumulated data. New means were then determined for the way each subject distributed his time between the five categories. The histograms for all observations, the data obtained from each histogram and the progressive fluctuations of the means for time distribution are shown in Appendix A.

The effect on the subjects' play indices of progressively incorporating data from new observations into accumulated data is shown in Figure 1. The wide fluctuations evident after the first few observations became progressively reduced and the play index stabilized.

The final percentage time distributions for each subject between non-play and the four categories of play are set out in Table II.

2. Obtaining a representative sample of the subjects' behavior

New data being incorporated into the accumulated data resulted in fluctuations in the mean distribution of time between the five behavioral categories. These fluctuations were expressed as a 'total discrepancy', expressed as T.D. on the histograms in Appendix A. Each indi-

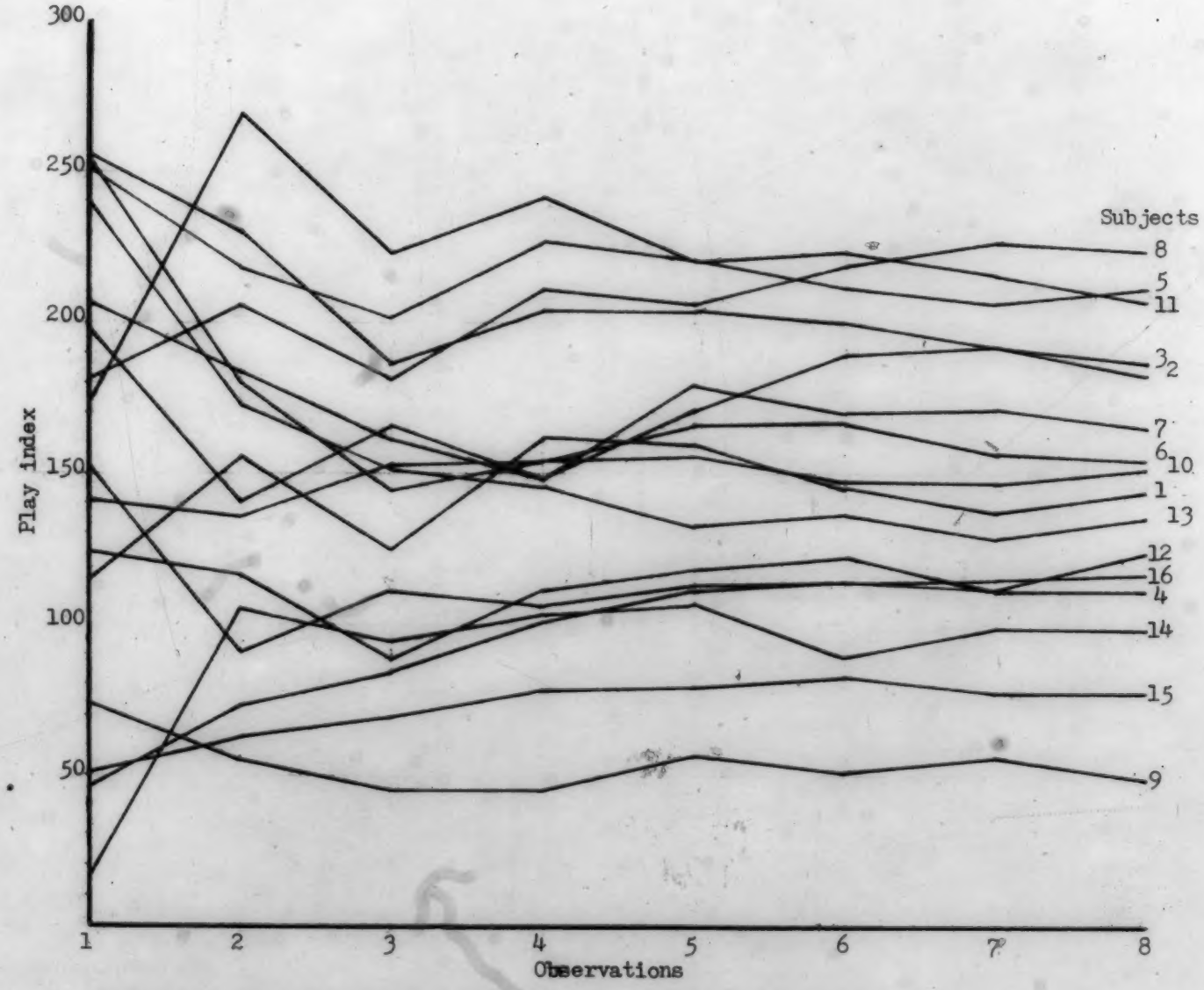

Figure 1: Mean play indices of subject's over repeated observations.

TABLE II

PERCENTAGE TIME DISTRIBUTION BETWEEN NON-PLAY AND THE FOUR LEVELS OF PLAY WITH FINAL PLAY INDICES

Subject	Non-Play	Level I	Level II	Level III	Level IV	Play Index
1	23.6	35.3	14.2	26.7	0	143.6
2	16.2	21.1	26.1	36.5	0	18 .8
3	8.2	32.4	24.6	34.7	0	185.7
4	36	30	20.1	13.8	0	111.4
5	0	25.2	38	36.7	0	211.3
6	4.8	49.3	32.5	13.2	0	153.9
7	18.3	19.8	40	21.7	0	164.9
8	3.7	18.3	28	49.8	0	223.7
9	64.0	23.8	11.6	.5	0	48.5
10	16.0	28.3	42.7	12.8	0	152.1
11	5.1	21.6	40.8	24.1	8.1	207.9
12	32.5	22.8	34	10.6	0	122.6
13	10.8	56.2	19.7	13.1	0	134.9
14	50.1	14.8	22.7	12.2	0	96.8
15	25.7	70.8	3.3	0	0	77.4
16	11.8	59.6	27.1	1	0	117.6
			MEAN SCORES			
	20.4	32.9	26.6	19.2	.5	145.9

vidual's total discrepancy was graphed, as shown in Figure 2. The mean of the total discrepancies for all sixteen subjects was also graphed, as in Figure 3. This was used to determine when observations would cease. A critical value of 10 had been set as a criterion for this mean. Figure 3 shows that this critical value was reached after eight observations. The significance of this operation to the validity of the instrument is considered in the next section under Question 2.

3. Validity

Any measuring device which does not actually measure what it is claimed to measure is virtually useless. The value of the present instrument hinges on its validity. Evidence will be presented which indicates that valid assessments were obtained of the subjects' sensori-motor play.

It would seem that the validity of the instrument could be doubted with respect to three questions. These questions will be considered in turn.

Question 1. Were the instrument's categories of sensori-motor play hierarchically arranged?

The qualitative aspects of the instrument described in Chapter III, were derived from Piaget's (1953) theory of the hierarchical emergence of sensori-motor behaviors. This theory has been widely acclaimed. However, the five or six year old mental retardate displays different behaviors from those of the normal sensori-motor infant described by Piaget. Locomotion, for example, is usually more advanced in the older retarded child than in say a 15 month old normal infant. Logic had to be used in fitting observed behaviors into the most appropriate of the instrument's categories, guide-lines for which had been taken from Piaget. The adjudged level of sophistication of a behavior was used as the criterion.

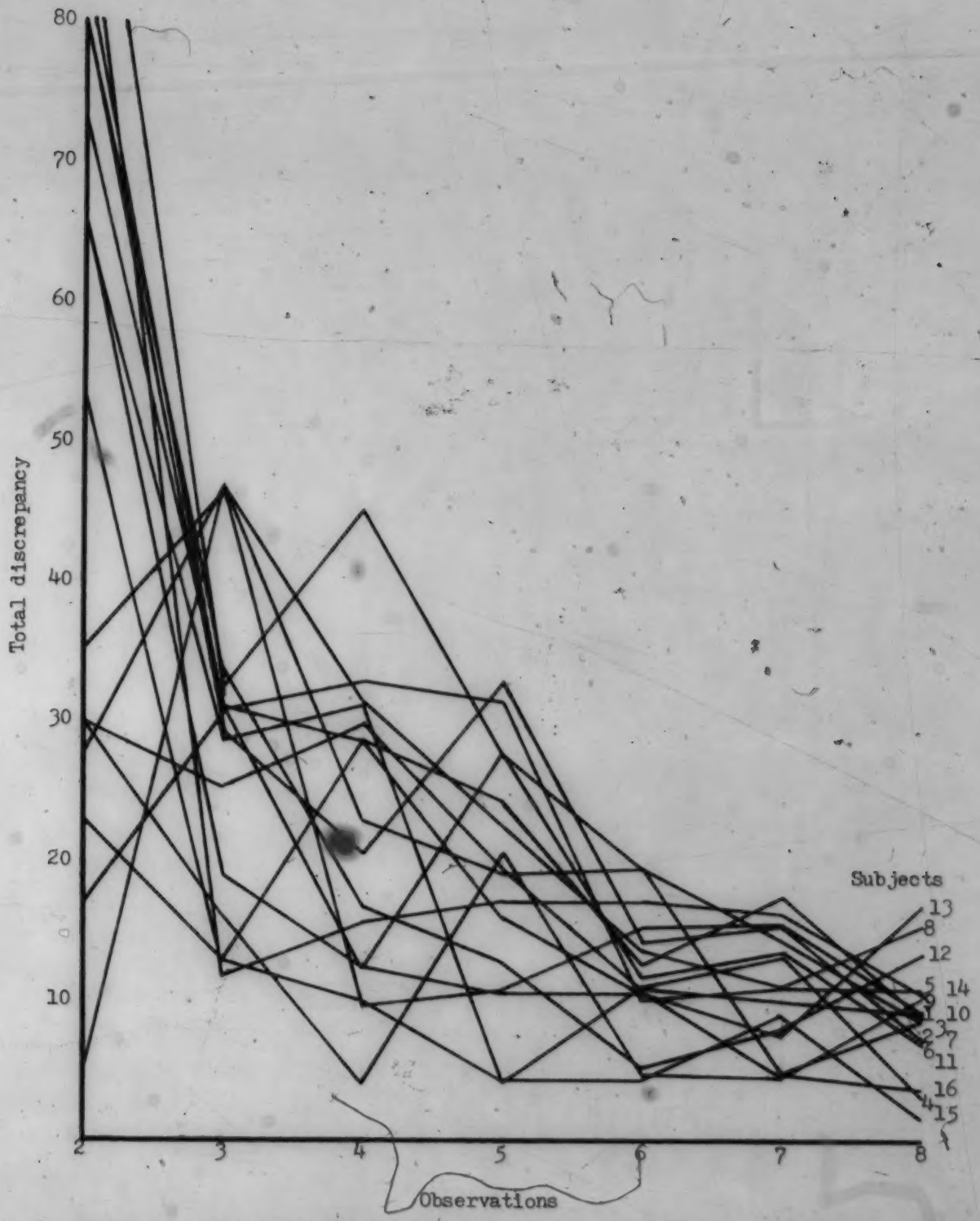

Figure 2: Subjects' total discrepancies over repeated observations.

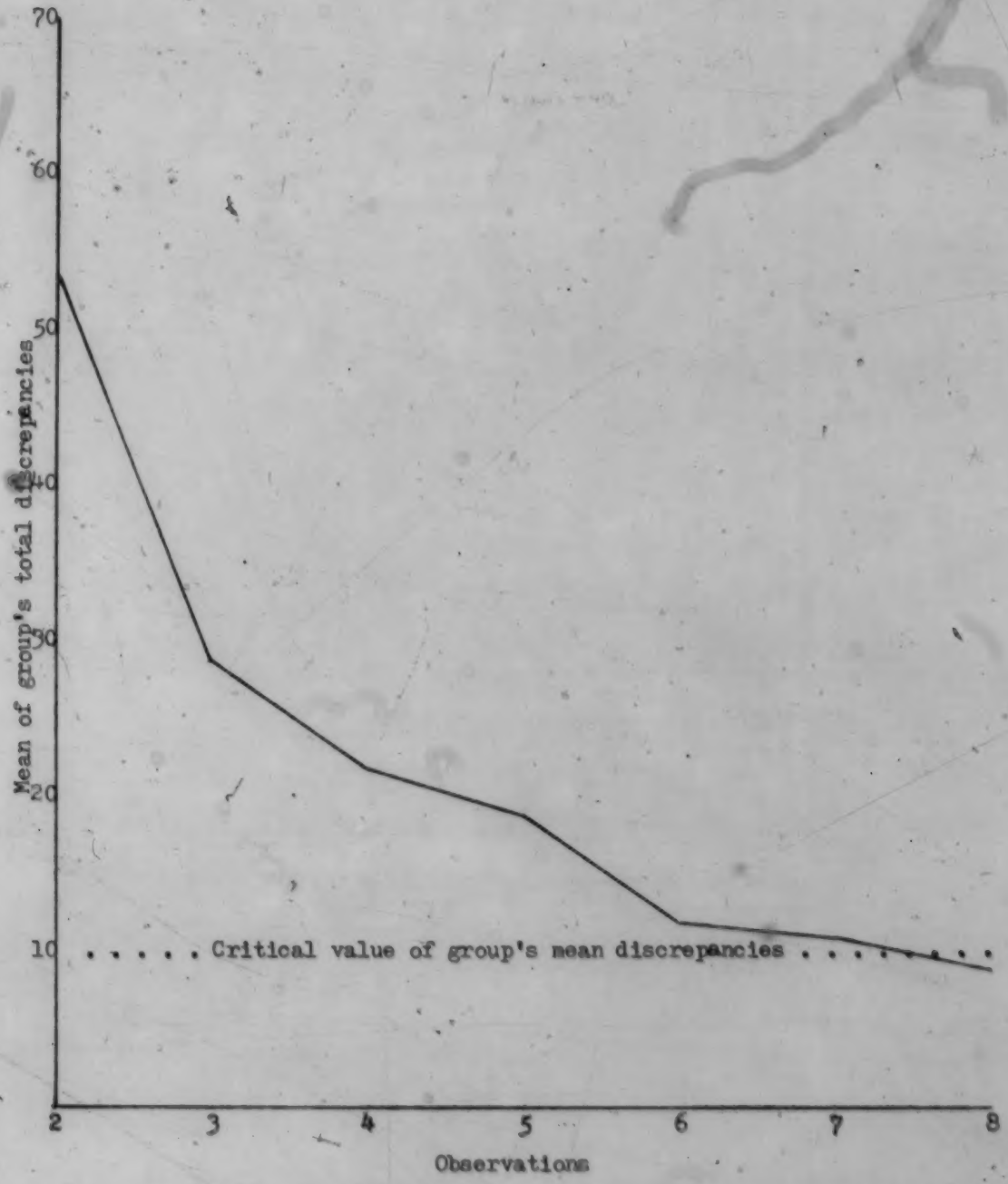

Figure 3: Mean of group's total discrepancies over repeated observations.

Although there appears to be good internal consistency in each hierarchy, intermeshing the sequential emergence of actions on objects, as described by Piaget, with the sequential emergence of actions on one's own body, i.e. locomotion, opens the instrument to criticism. However, decisions were made in this regard only after extended preliminary observations of the subjects' play patterns. It was decided from these that in non-play there would be no action on objects, nor any locomotion. Now, if Level III play were to include the most sophisticated forms of purely sensori-motor (i.e. non-symbolic) actions on objects, then it should contain also the most sophisticated locomotor activities. While Piaget's theory gave guidance on the allocation of observed behaviors to Levels I and II actions on objects, the normal maturation sequences, (eg. walk, run, run down a slope), were used for locomotion categorization.

Some support for the hierarchy of behaviors defined comes from the fact that all of the subjects displaying higher levels of play also exhibited all of the lower levels. There was no gap in the repertoire of play levels.

Question 2. Was a representative sample of the subjects' play behavior obtained from the eight observations?

The investigator argued that the subjects, after only eight 100 second observations, had shown how they normally distributed their play time between the five behavioral categories in the play setting used. Only minimal fluctuations in the group's mean for total discrepancies would have been evident after the eighth observation. This would be due to the fact that the accumulation of data over repeated observations tends to result in the progressive reduction of the total discrepancy. As the distribution of time between the five behavioral categories becomes

stabilized, it may be reasoned that a representative sample of behavior has been obtained.

While the use of the total discrepancy as a criterion for the cessation of observations proved simple enough, it introduced into the study an unnecessary complication. An alternative and preferable criterion would have involved using the play indices.

Figure 1. shows the fluctuations in play indices over repeated observations. The marked changes after the early observations should be contrasted with the minor fluctuations after the sixth observation. The final play indices ranged between 48.5 and 223.7. The mean change in play indices as a result of adding in data from the second observation was 41. However, on the addition of data from the 8th observation, there was a mean fluctuation of only 5.1 in the subjects' play indices. This provides further evidence that a representative sample of the subjects' play behavior was obtained after eight observations.

Question 3. Does the final play index give a valid measure of a subjects' play behavior?

Assuming that the qualitative categories of the instrument are valid, the practice of multiplying an ordinal number (level of play) by a number from a ratio scale (seconds) to obtain the play index could be regarded as statistically questionable. For some, the index obtained would be an invalid one produced from time distributions that may, in themselves, have been acceptable.

The index was adopted largely for the convenience of conducting tests of validity and reliability. However, it is suggested that the index has a high degree of validity in terms of the quantity and quality of a subject's play.

The range of possible indices is from 0 to 400. To obtain a high score during an observation (say 200+), a subject would need to be involved in play (i.e. quantity) for all or most of the 100 seconds of the observation. Further, his play behavior would need to be rated at least at Level II or III (i.e. quality) for most of the period. Using the same reasoning, a low score of say less than 50 could only be obtained if the subject were idle (i.e. engaged in non-play) for more than half of the observation. The final play index is therefore very sensitive to two basic questions that could be asked about a subject's play behavior: Is he characteristically busy or idle? and, is his play activity normally simple or sophisticated?

To summarize, the argument presented supports the instrument as a valid device for assessing the sensori-motor play of the subjects used in this study. This gains further support from the results of comparing play assessment scores determined by three groups of judges, with play indices obtained from the instrument. The results are set out in Table III.

Correlation coefficients obtained were as follows:

(1) Investigator's play indices vs. University staff: $r = .71$,

(2) Investigator's play indices vs. Student assistants: $r = .71$,

(3) Investigator's play indices vs. Classroom teachers: $r = .56$,

(4) Investigator's play indices vs. Mean scores from all three groups of judges: $r = .70$.

All four correlation coefficients were significant at the established .05 level of confidence.

From this evidence, the null hypothesis (1) was rejected and it was concluded that there was agreement between the instrument's indices

TABLE III

PLAY INDICES FROM INSTRUMENT vs. JUDGES' ASSESSMENTS

SUBJECT	INSTRUMENT'S INDICES	JUDGES' SCORES			
		UNIVERSITY STAFF	STUDENTS ASSISTANTS	TEACHERS	MEAN
1	143.6	31.5	35.3	31.5	32.8
2	182.8	42.5	45.6	47.5	45.2
3	185.7	30	34	34.5	32.8
4	111.4	31.5	26.3	24.5	27.4
5	211.3	27	33	35	31.7
6	153.9	29	35.3	35	33.1
7	164.9	29	41	43.5	37.8
8	223.7	33	42.3	36	37.1
9	48.5	11.5	15.6	26	17.7
10	152.1	25	23.3	44	30.8
11	207.9	33	28.6	38	33.2
12	122.6	29	34	41.5	34.8
13	134.9	10.5	16	16	14.2
14	96.8	17	22.6	35	24.9
15	77.4	5	6	6	5.7
16	117.6	15	10.3	16	13.8

Instrument vs. University staff: r = .71
Instrument vs. University student assistants: r = .71
Instrument vs. Class teachers: r = .56
Instrument vs. Mean scores of judges: r = .70

as determined by the investigator and the judges' assessments of play behavior.

The two groups of judges actively involved in the play sections of the program (i.e. the University staff members and the student assistants) produce assessments which showed a high correlation with the instrument's indices (r = .71 in both cases). These judges had worked at fostering play activity among the subjects, twice a week, over a period of several months; they knew the subjects well. Being involved in teaching and studying physical education suggests that they would have a good understanding of play and that they could be regarded as highly competent judges.

The class teachers were non-participant observers in the play sections of the program. It is not surprising therefore, that their mean assessment scores correlated only moderately with the play indices.

4. Intra-observer reliability

The investigator determined play indices for 48 fifty second observations and repeated this one week later using the same tape recordings. The scores obtained are shown in Table IV. The calculated correlation coefficient between the two sets of scores was r = .992. This was corrected using the Spearman-Brown Prophecy Formula to determine the 'r', if full 100 second observations had been used. Thus

$$r_{(100)} \text{ (for 100 second observations)} = \frac{2r_{(50)}}{1 + r_{(50)}}$$

$$= \frac{2 \times .992}{1 + .992}$$

$$= .996$$

This result was significant at the .05 level of confidence which had been established.

TABLE IV

INTRA-OBSERVER RELIABILITY

Play indices determined by the investigator from two different observations of the same 48 fifty second samples of videotaped play behavior.

SUBJECT	TEST	ORIGINAL OBSERVATION INDEX	REPEATED OBSERVATION INDEX ONE WEEK LATER
1	1	58	57
	2	4	4
	3	87	89
2	1	38	35
	2	78	78
	3	150	150
3	1	97	89
	2	129	130
	3	150	140
4	1	94	100
	2	95	99
	3	49	51
5	1	150	150
	2	150	150
	3	85	92
6	1	84	77
	2	75	83
	3	86	86
7	1	60	64
	2	38	38
	3	150	150
8	1	150	150
	2	150	150
	3	150	150
9	1	0	0
	2	24	24
	3	47	53
10	1	98	100
	2	87	89
	3	35	36

"TABLE IV - Continued."

SUBJECT	TEST	ORIGINAL OBSERVATION	REPEATED OBSERVATION
11	1	200	200
	2	162	155
	3	150	150
12	1	58	65
	2	30	50
	3	59	62
13	1	56	60
	2	70	75
	3	81	68
14	1	67	69
	2	62	59
	3	0	0
15	1	32	45
	2	50	45
	3	68	70
16	1	74	65
	2	80	80
	3	90	105

Correlation coefficients for 100 second observations: r = .996

A 't' test to determine whether there was significance in the difference between the means of the 48 paired scores produced t = .206, well below the critical value of 2.021 (α = .05, d.f. = 47).

From this evidence, null hypothesis (2) was rejected and it was concluded that the instrument was reliable, as indicated by intra-observer assessments. These results are considered further in the next section.

5. Inter-observer reliability

Play indices were determined by the investigator from 48 fifty-second videotaped observations. The same tapes were also coded by two observers trained in the use of the instrument. These indices appear in Table V. The three sets of scores were compared as shown in Table VI.

TABLE VI

RESULTS OF RELIABILITY TESTS

	Investigator vs. Observer 1	Investigator vs. Observer 2	Observer 1 vs. Observer 2
r on 48 fifty second observations	.967	.975	.966
r for 100 second observation, using Spearman-Brown Prophecy Formula	.983	.987	.983
Significant at the established .05 level of confidence?	Yes	Yes	Yes
't' score on the difference between the means	.445	.828	1.17
Significant at the .05 level of confidence, d.f. 47.	No	No	No

Note: The critical value of the 't' (α = .05, d.f. = 47) was 2.021)

TABLE V

INTER-OBSERVER RELIABILITY

Play indices determined from 3 fifty second videotaped samples of play behavior of each subject.

SUBJECT	TEST	INVESTIGATOR	OBSERVER 1	OBSERVER 2
1	1	57	62	42
	2	4	6	4
	3	89	89	116
2	1	35	53	45
	2	78	84	85
	3	150	150	150
3	1	89	98	79
	2	130	121	135
	3	140	124	132
4	1	100	74	103
	2	99	96	97
	3	51	67	45
5	1	150	144	144
	2	150	142	150
	3	92	106	80
6	1	77	102	92
	2	83	83	94
	3	86	78	71
7	1	64	100	102
	2	38	41	36
	3	150	150	150
8	1	150	150	137
	2	150	150	142
	3	150	150	150
9	1	0	0	0
	2	24	32	31
	3	53	58	50
10	1	100	94	98
	2	89	92	88
	3	36	37	36

"TABLE V - Continued."

SUBJECT	TEST	INVESTIGATOR	OBSERVER 1	OBSERVER 2
11	1	200	200	200
	2	155	150	137
	3	150	143	150
12	1	65	65	63
	2	50	42	44
	3	62	70	64
13	1	60	59	50
	2	75	53	58
	3	68	90	61
14	1	69	65	71
	2	59	50	60
	3	0	0	0
15	1	45	48	45
	2	45	46	45
	3	70	70	66
16	1	65	75	50
	2	80	88	87
	3	105	76	93

Correlation coefficients for 100 second observations:

Investigator vs. Observer 1 : r = .983

Investigator vs. Observer 2 : r = .987

Observer 1 vs. Observer 2 : r = .983

From this evidence, null hypothesis (3) was rejected and it was concluded that the instrument was reliable, as indicated by inter-observer assessments.

The mean of the correlation coefficients for intra--and inter-reliability was r = .98. Three reasons are suggested for these very high correlations.

(1) Possibly there was a tendency for the investigator and the two trained observers to interpret the action units of some subjects according to preconceived and previously discussed ideas on the subjects' play habits and general ability. This may have had the effect on all three observers of uniformly raising or depressing some indices. Perhaps it would have been preferable to have used observers who were not connected with the program.

(2) The scores obtained for the 50 second observations used for the reliability tests covered the maximum range (i.e. from 0 to 200). Generally there was little disagreement between observers on scores at the upper and lower ends of the range. There was little difficulty for example, in identifying non-play. These uniform high and uniform low scores would have had a major influence in producing a high 'r' rating.

(3) The videotaped observations made possible repeated viewing of the same play sequence. This would obviously increase the chances of accurate rating by all observers. The dubbing of an "audio" second count onto the videotape appeared to minimize errors involved in defining, in terms of time, the length of action units.

6. Sensitivity

The subjects used in this study could be regarded as a cross sectional group of pre-school trainable mentally retarded children. They

were all of the children from the two pre-school classes at the Winnifred Stewart School.

It was a significant feature of the instrument that a wide range of play indices was obtained from these subjects. The range of scores for one observation of 100 seconds was from 0, when a subject spent the whole observational period at non-play, to 362 in the case of a subject who spent a substantial part of an observation engaged in symbolic play (Level IV). The maximum possible score for an observation would be 400.

The range of final indices was from 48.5 to 223.7 with a mean of 146 and a standard deviation of 47.9. This indicates that the scores were well scattered throughout the range. Therefore, the instrument appears to be sensitive to differences in play behaviors.

7. The use of videotaping procedures

The method used for observing the subjects in this study involved videotaping each subject in turn for 100 seconds during successive play periods. Data was derived by repeated observations of the videotape.

The advantages of using this technique were as follows:

(1) The observer had limitless opportunities to decide upon the timing of the action units and upon their qualitative categorization.

(2) The procedure had great value for testing the reliability of the instrument.

The main disadvantages of using videotaping were as follows:

(1) The extraction of data from the tapes was a lengthy procedure. Initially, the investigator required an average of approximately one hour to process an observation of 100 seconds. With practice, this was reduced considerably to approximately 12 minutes.

The observers involved in the reliability tests profited from the

experiences of the investigator and required an average of approximately 10 minutes to process a 50 second observation. Although the time involved in processing is seen as a disadvantage of the instrument, it should be weighed against the reliability of the data produced. In the situation described, the reliability of the instrument was being tested and it is understandable that the observers would take more time over the processing than would normally be necessary. The high reliability coefficients obtained (mean r = .98) testify to the care taken by the observers to obtain accuracy of assessment.

(2) The lack of manoeuvrability of the camera used in the study resulted in occasional periods when a subject was obscured. In these cases, the subject was assumed to have carried on with the same behavior engaged in before being obscured. Further, when the subject was holding an object but facing away from the camera, it was sometimes difficult to decide whether he was attending to the object (Level II) or simply holding it (Level I). However, experience taught that shifts in visual attention were usually accompanied by slight, but characteristic movements of head or limbs.

(3) Any camera has a limited field of vision and some distortion of real play sequences sometimes occurred. This was particularly evident when the subject was very close to the camera, or when the telescopic lens was used on full power. Sometimes, happenings outside the field of vision of the camera had a bearing on the categorization of an action unit. The investigator, who had seen the live action, interpreted the tape differently from the observers involved in checking reliability. For example, on one occasion, a subject ceased rolling a ball to a partner, outside the camera's vision, because the partner's attention had been

distracted. The investigator, having observed the live action, rated the subject's inaction at Level III, while the observers, seeing only the inactivity on the tape, rated it as a lapse of attention at Level I, i.e. holding the ball. Generally, a decision on the value of using videotape recording in future use of the instrument would depend upon the value that is attached to obtaining reliable data. Certainly, this method has decided advantages in this regard."

In summary, the evidence suggests that the instrument developed during this study is valid, reliable and sensitive: As tested, in its present state, however, it requires considerable time to process videotaped observations to obtain data.

THE SUBJECTS' PLAY BEHAVIOR

Although a child's mode of play reflects much that is distinctly and uniquely him, it is also a product of many environmental factors: the temperature, the availability and quality of play things, the amount of space, the number and kind of playmates etc.

The play setting used in this study would be generally regarded as high in quality: the equipment and toys had been specifically chosen to suit the subjects. A more elusive, but none-the-less highly influential factor present throughout the program was the "atmosphere" of stimulation and encouragement which was established by those assisting with the program. In view of these things and the high ratio of assistants: subjects (approximately 1:3), the total play environment could only be described as highly stimulating.

These factors are mentioned so that the true import of the following discussion is appreciated. In fact, the observations made in this

study should not be regarded as being indicative of the normal way these subjects play. Rather, it is the way they played within the stimulative setting used in this study. For example, without the 'know-how' and the high physical and emotional input of the staff as they worked with the subjects, it is considered that the deficiencies observed in the play patterns would be even greater.

Play behavior may be considered in terms of its quantity and quality. Reference is made to Table II which gives the mean distribution of subjects' time between the various categories of play.

Consideration is given first to the percentage of time given by the subjects to play, as opposed to non-play. It will be seen from Table II that the mean time spent in non-play was 20.43%. In other words, for approximately 1/5th of their play time, the subjects did not engage in any form of locomotion, nor did they interact in any way with play objects.

However, it should be recognised that the behavior described for Level I play, while serving a purpose with respect to this study, would not normally be recognised as play. For example, a child sitting holding a ball without attending to it, is regarded by the instrument as being involved in Level I play. The reasons for including this category in the hierarchy were: first, it sensitised the lower end of the hierarchy of play behaviors. (Level I play is a marked advance over the gross unresponsiveness observed among many severely retarded children); second, if the accepted definition of play, "intrinsically motivated action on objects," is applied liberally enough, such activities fit within the scope of play.

The finding of the present study with respect to the time spent

in idleness may be compared with those of Rosenthal (1972) who studied the play of normal nursery school children. However, such a comparison is difficult because Rosenthal's definition of "idle time" covered a much broader range of activities than the present study's "non-play". For example, Rosenthal included "horse-play" in idleness, and although she did not define the term, it is evident that it would not be rated as non-play by the instrument. Any comparison between the present subjects' play and that observed by Rosenthal in normal children would therefore need to recognise that much of the 32.86% of the total time that the present subjects spent in Level I play, was in fact, idleness. Hence, it is suggested that Rosenthal (1972) would probably regard nearly 50% of the behavior of the subjects in the present study as idleness.

The striking feature of the play of the subjects in the present study is only seen when this idleness figure which would be approximately 50%, is compared with Rosenthal's findings. She found that her normal nursery school subjects spent less than 3 minutes per hour in "idle-time," (i.e. less than 5%).

Considering again the non-play category of the present study, the range observed between the individual subjects was considerable. Subjects 9 and 14 spent more than 50% of their observational time in non-play. On the other hand, Subject 5 never engaged in this category of behavior.

The low incidence of symbolic or thematic play (Level IV) is the other significant feature of the data presented in Table II. Although no objective data was found in the literature on the incidence of such play among normal populations, it is well recognised that "make-believe" play is one of the main characteristics of normal children between two and seven years of age. In the present study, symbolic play was observed

on only one occasion and it accounts for only .5% of the total observational time.

Accurate comparisons between the play of normal children and that of retardates cannot be made. However, there would seem to be sufficient evidence here to reach similar conclusion to that of Feitelson and Ross (1973) after their study of children's play:

> Our study showed that some present day pre-school pupils are unequipped to show initiative in the use of equipment, and in engaging on their own in those kinds of behavior deemed especially conducive to their future development. (p. 221)

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

This study emerged from the investigator's observation that the free play behavior of a group of mentally retarded children appeared quantitatively and qualitatively inferior to that of normal children of the same age. On consulting the limited literature on this topic, some support was found for this subjective opinion. Some writers on the environmental deprivation suffered by mental retardates (notably Zigler, 1967), believed that many retardates do not even behave or perform in a manner commensurate with their mental age. Ross (1970), applied many of the points raised by Zigler to explain the inadequacies of retardates' play behavior.

This evidence, plus [illegible] support in the literature for play as a medium for learning, posed a number of questions. For example, given that the incompetence observed in mentally retarded children is rooted in cognitive inadequacies, could this basic incompetence be compounded by the failure of the retardate to develop adequate play patterns? Would a mentally retarded child display less incompetence, if he were stimulated and encouraged to play from infancy? In other words, is the mentally retarded child per se, support for Gilmore's (1966) statement, ". . . if play behavior were to be prevented somehow . . . then many fewer abilities and concepts would remain available to the child." (p. 350)

It was considered that the answers to the kinds of questions posed would require the use of an adequate technique with which to assess play behavior in terms of its quantity and quality. However, no appropriate means was found in the literature to assess the sensori-motor play observed among the subjects whose seemingly inferior play had initiated the investigation. Thus, the problem focused on developing an instrument which might prove useful in future studies on the play of mentally retarded children.

The investigator merged and adapted a method which had been used by Rosenthal (1972) to obtain quantitative data on children's play with Piaget's well recognised sequential stage theory for the emergence of sensori-motor behaviors.

The resulting instrument was demonstrated by being used to obtain data from videotaped 100 second observations of the subjects' play, taken over a number of different play sessions. The data were the individual subject's distribution of time between non-play and the four hierarchical levels of sensori-motor play which had been defined. Methods were determined for representing the stream of play behavior graphically and for presenting data. Also, a play index was suggested which appeared to be indicative of the quantity and quality of a subject's play.

Observations ceased after eight play sessions when the addition of new data made no significant difference to the subjects' mean distribution of their play-time between the different levels of play. At this point, it was reasoned that the accumulated observations represented accurately the play behavior of the subjects. The final play index for each subject was determined at this point from the percentage distribution of their total play-time between the four categories of play.

Tests were conducted to determine whether the instrument had validity. These involved three groups of judges who had worked with the subjects in various ways. The judges' play assessment scores for the individual subjects were compared with the play indices determined by the investigator using the instrument. A mean r = .70 was obtained. The lower correlation obtained by one of the three groups of judges was attributed to the fact that these were non-participant observers of the play program in which the subjects were engaged. The remaining two groups of judges were involved in fostering play activities and therefore should have had a keener understanding of the subjects' play.

A test was conducted on the intra-observer reliability of the instrument. The investigator coded 48 fifty second videotaped observations of the subjects' play behavior and determined play indices for each. This was repeated using the same videotapes after a period of one week and the two sets of scores were compared. An r = .99 was obtained and a 't' test indicated that there was no significant difference between the means of the paired scores.

Two observers were instructed in the use of the instrument and they and the investigator coded 48 fifty second videotaped observations of the subjects' play. A mean r = .98 was obtained when the three sets of scores were compared. The application of a 't' test indicated that there was no significant difference between the scores.

The subjects' play indices obtained from the instrument ranged from 48.5 to 223.7, with a mean of 146 and a standard deviation of 48. This suggested that the instrument was sensitive in that it was able to distinguish between the play behaviors of the subjects.

Consideration was given to the merits and demerits of using video-

taping procedures as the basis of the methodology for the instrument. In future use of the instrument the seemingly high reliability would need to be weighed against the time required to process videotaped observations.

Finally, references were made to the observed play behavior of the subjects. Comparisons with normal populations were difficult because of the limited information available and because of problems in equating categories of behavior used in different studies. However, in view of the stimulating play setting used for this study, it would seem that the play of the subjects was limited in terms of quantity and quality when compared with that of normal children. Deficiencies in these two aspects of play were illustrated respectively by the high incidence of non-play and the low involvement in symbolic play.

CONCLUSIONS

This study produced an instrument with which to assess the sensori-motor play of pre-school trainable mentally retarded children. From the results of the limited tests conducted, it appears that the instrument is valid and reliable. Also, it was sensitive enough to discriminate between the play behaviors of the subjects.

Methods suggested for graphically representing the stream of sensori-motor behavior and for presenting data appear to have value.

The likely limitation on the future use of the instrument in its present form is related to the excessive time that was required to process videotaped observations. However, it seems likely that much less time could be spent on the processing without sacrificing too much accuracy. Further, it is considered that reliable play data could be obtained through a large number of instantaneous observations, without the need

for videotaping procedures. If this were possible, the modified instrument could provide useful information on how the sensori-motor child was currently coping with his environment.

RECOMMENDATIONS

As the result of the information gained in this study, the following recommendations are made.

1. Further study is recommended to determine the effect on reliability when the existing instrument is tested under conditions which limit the number of re-views of a videotaped observation.
2. It is recommended that a study be attempted to determine the number of instantaneous observations of "raw" behavior required to obtain data which would be representative of a subject's play behavior.
3. It is suggested that the instrument be tested in different play settings and among different populations, including normal infants ages one to two years.
4. Although the play index has been widely used in this study, it is suggested that the true value in using the instrument lies in the direct analysis of time distribution between the five behavioral categories.
5. The instrument is suggested as an assessment device in the test: treatment: retest experimental design to ascertain the effectiveness of various programs.
6. The strongest recommendation arises from the observations of the extremely limited play repertoires of the subjects in this study. These appeared to owe a great deal to parental ignorance on the value of, and the procedure for stimulating and fostering play in mentally retarded children. This observation was supported by numerous comments found in

subjects' personal records kept at their school: comments by psychologists and school counsellors. It is therefore recommended that a suitable agency be established to contact parents of infant mentally retardates and to educate them in the value of early stimulation and play.

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APPENDIX A

HISTOGRAMS OF PLAY OBSERVATIONS

Interpretation of histograms

Each of the following 16 pages represents the second by second play involvement of a different subject observed during eight 100 second periods. The X axis is divided into 100 seconds; the Y axis from 0 (non-play) to 4 (Level 4 play).

Above each histogram on the left side is the data derived from the histogram expressed in the form

$$\overset{B}{\overbrace{}}$$
$$A\ C\ D\ E\ F$$

Where A is the percentage of time spent in non-play

C is the percentage of time spent in Level I play

D is the percentage of time spent in Level II play

E is the percentage of time spent in Level III play

F is the percentage of time spent in Level IV play

and B is the play index $(1 \times C + 2 \times D + 3 \times E + 4 \times F)$ =

Above each histogram on the right side is the mean distribution of the time spent at the various play levels which was determined from the accumulated data.

Above the histograms on the extreme right hand side is the total discrepancy (T.D.) between the mean distribution of time between the five categories determined after any observation and the mean distribution which had been determined following the previous observation. For example, in the case of Subject 1, the mean distributions were:

after Observation 1,	44	12	29	15	0
and after Observation 2,	22	32	14.5	31.5	0
Discrepancies	22	20	14.5	16.5	0

Total discrepancy therefore was 73 after Observation 2.

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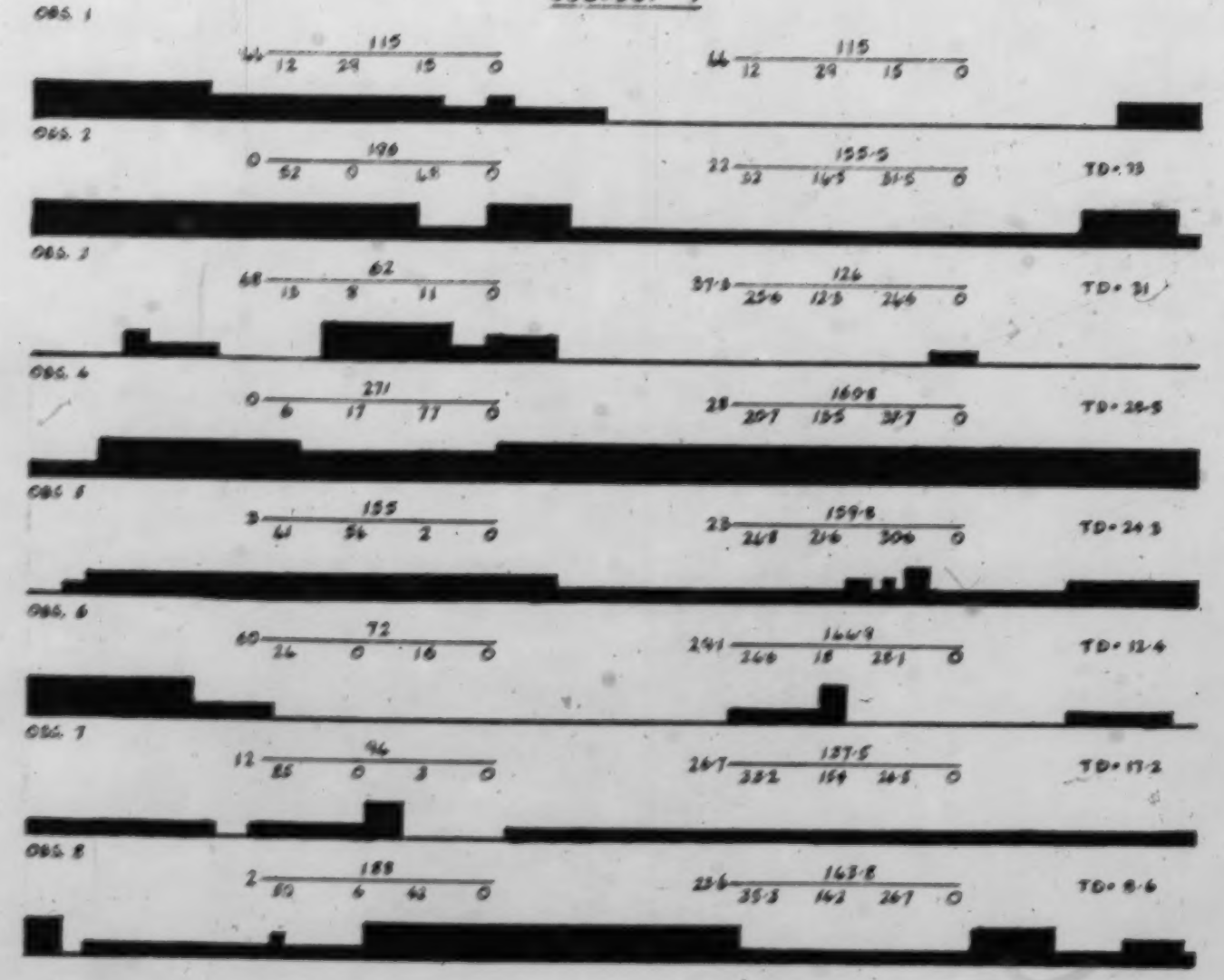
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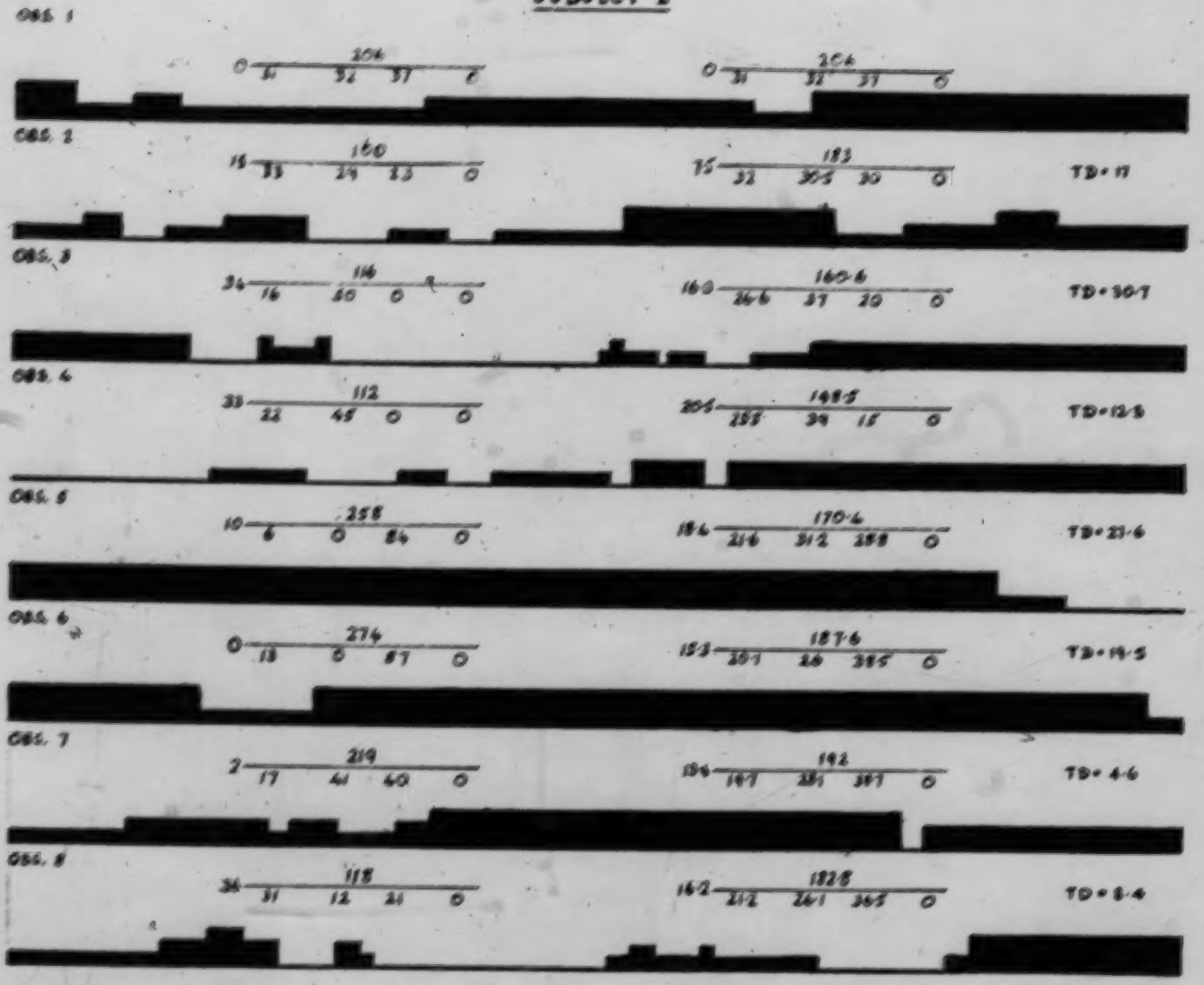
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16 20 0 0 26·6 37 20 0
TD·30·7
OBS. 4
33 112 205 148·5
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TD·12·5
OBS. 5
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6 0 84 0 21·6 31·2 25·8 0
TD·23·6
OBS. 6
0 274 153 187·6
13 0 87 0 20·1 26 38·5 0
TD·19·5
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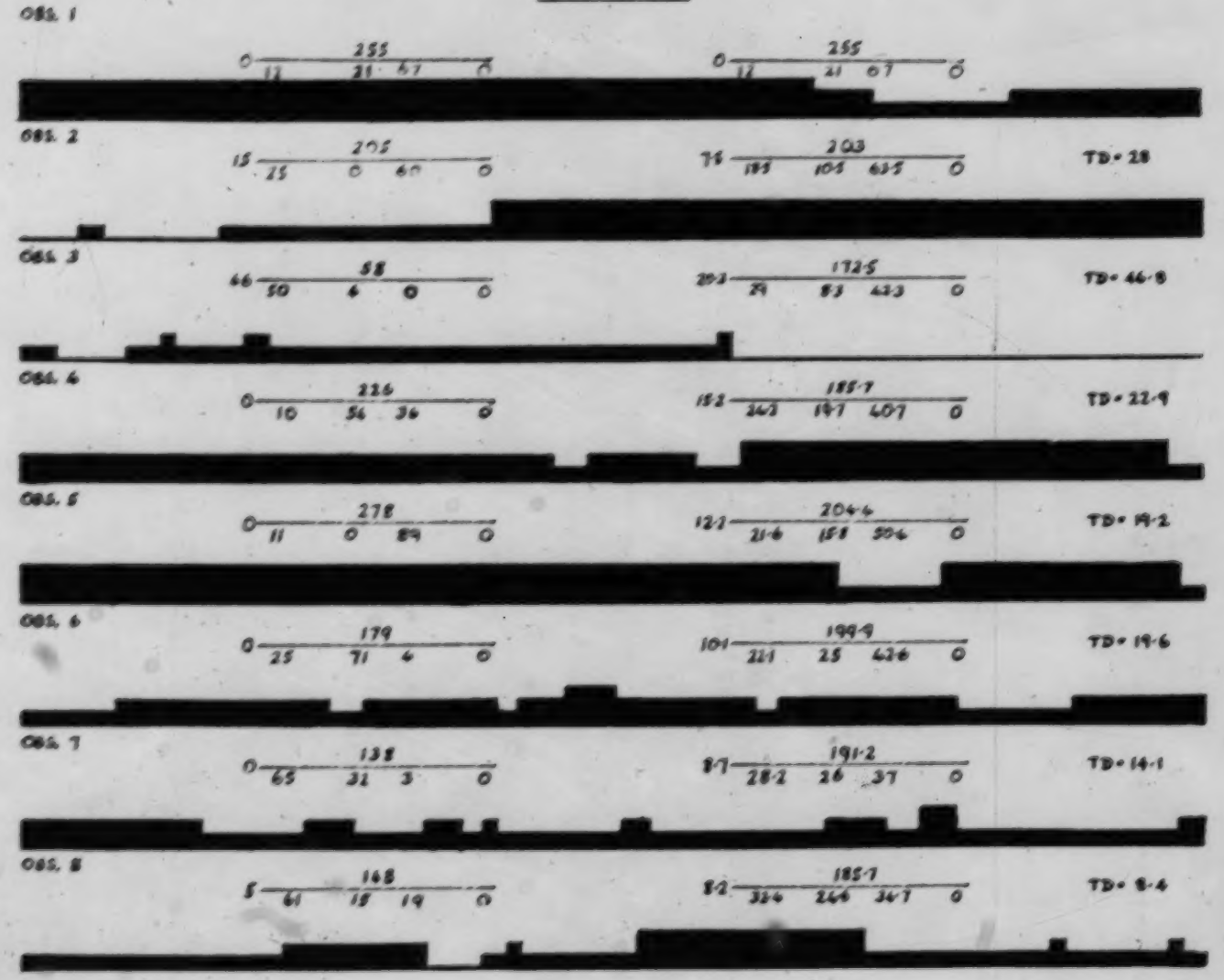
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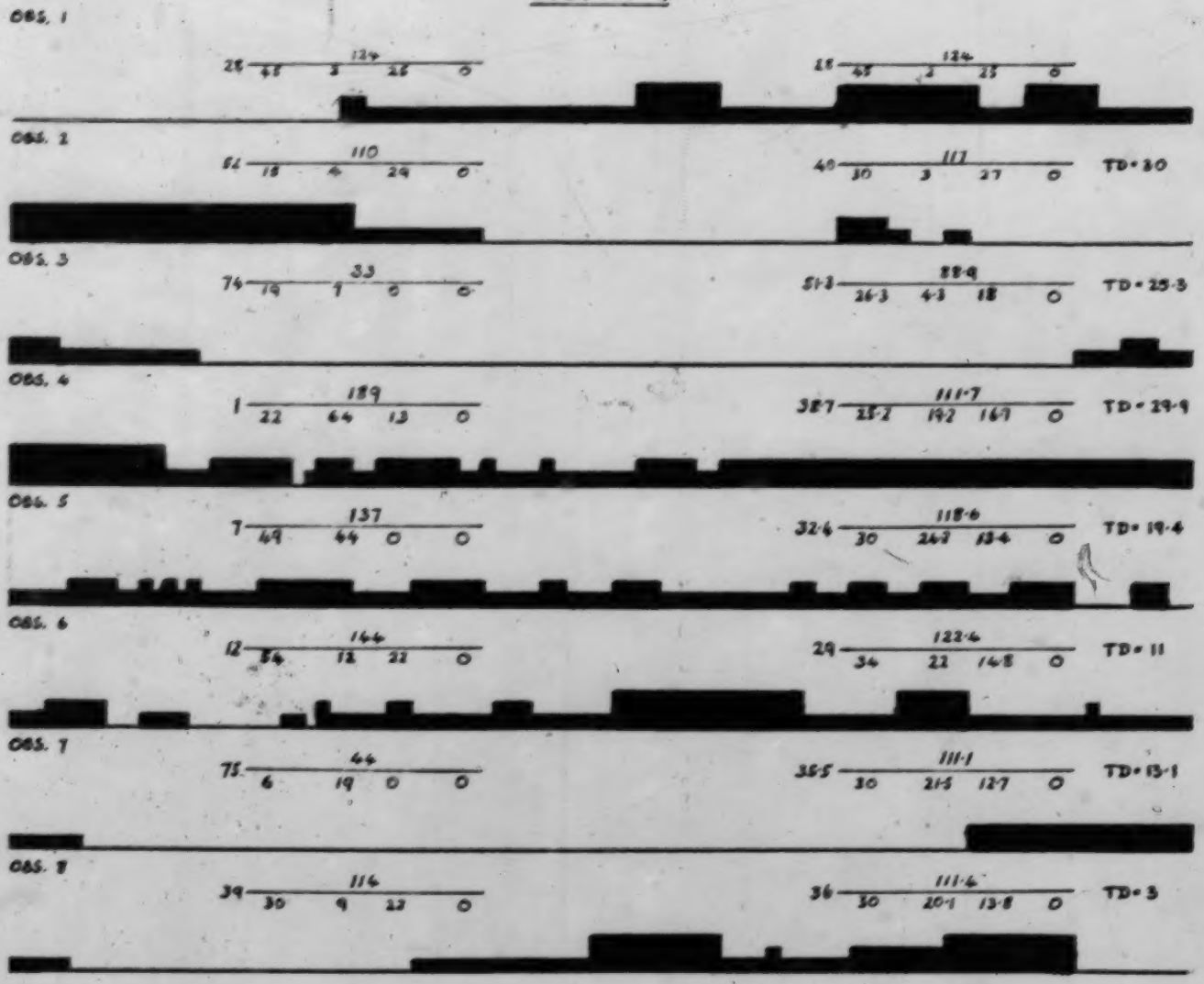
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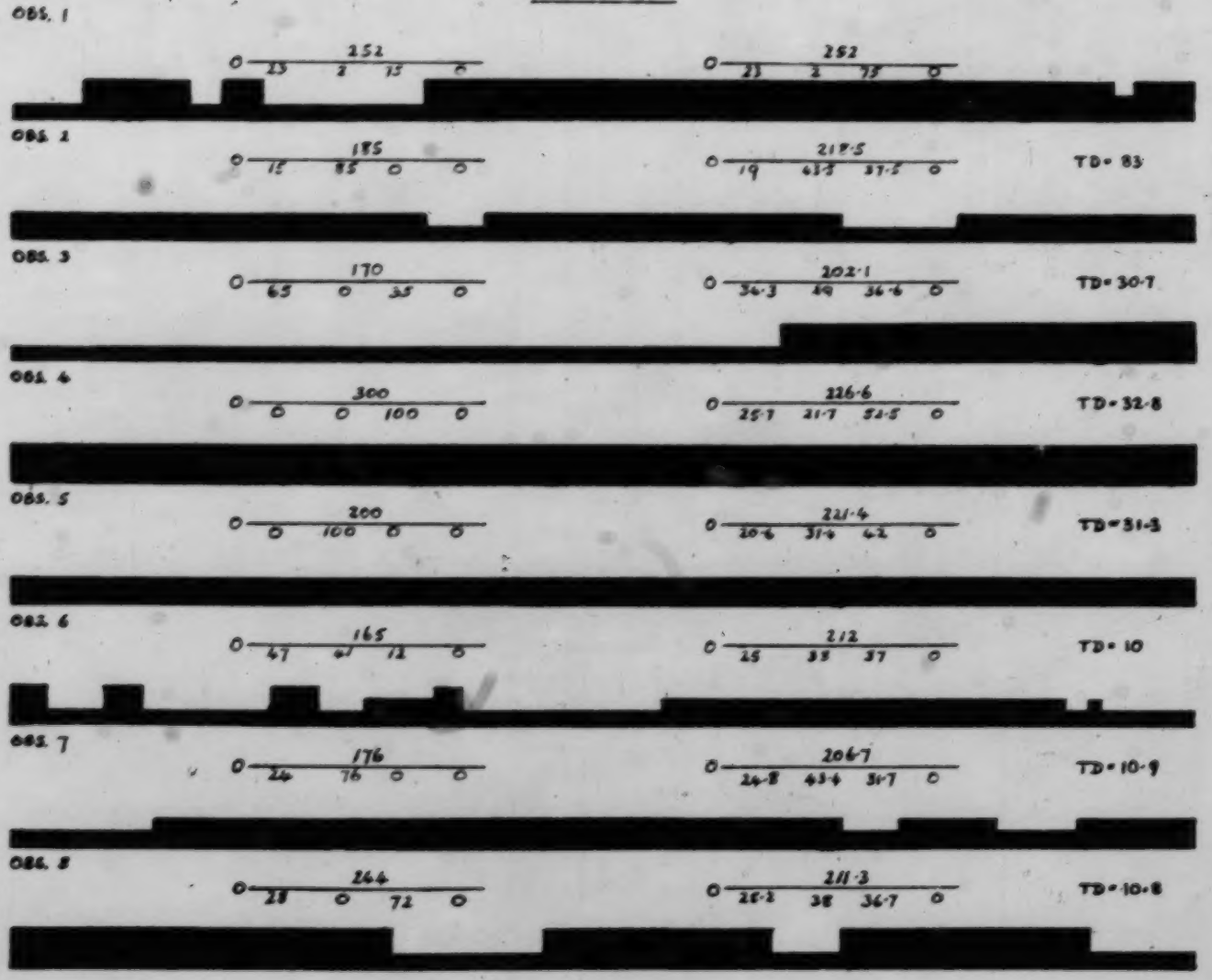
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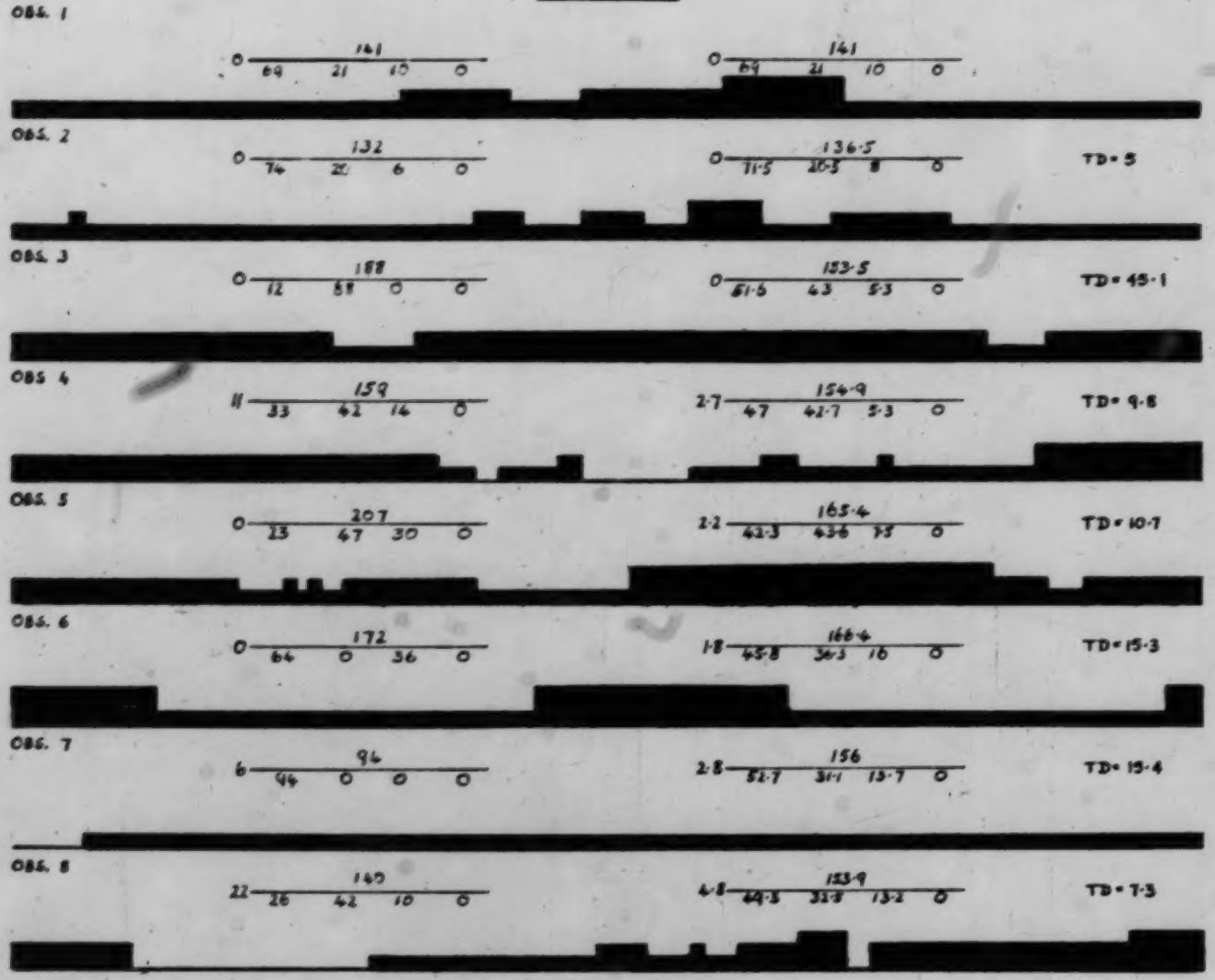
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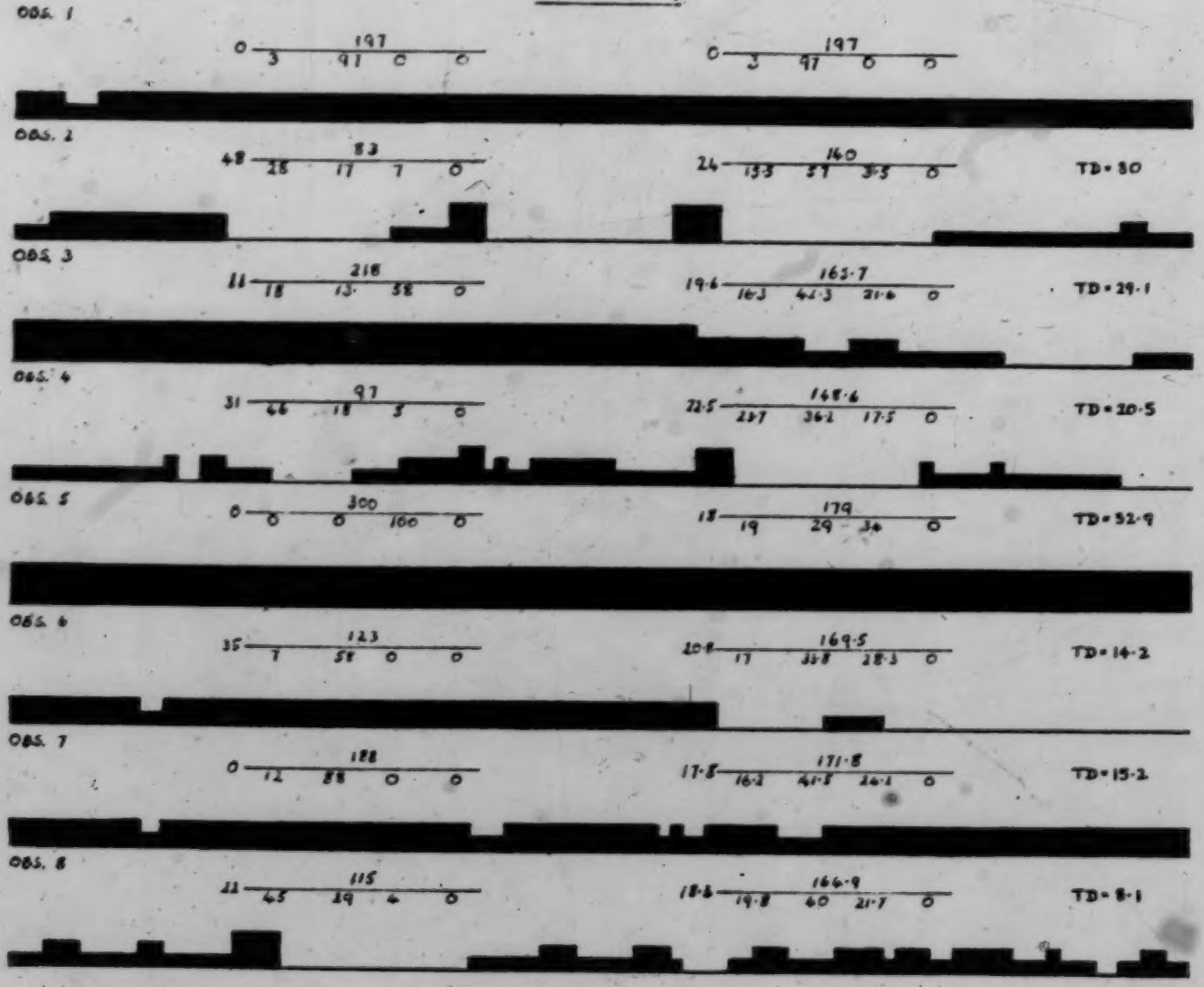
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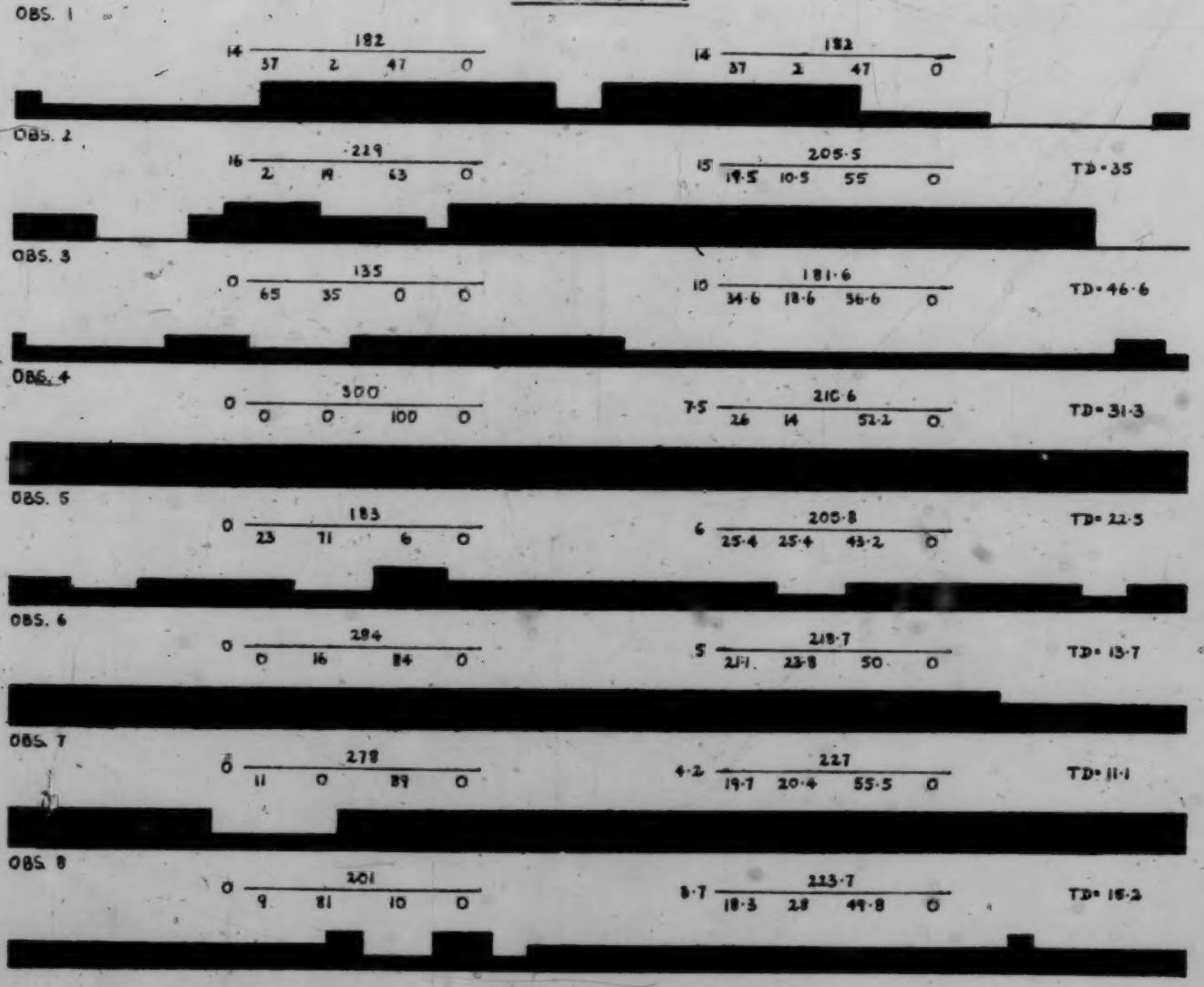
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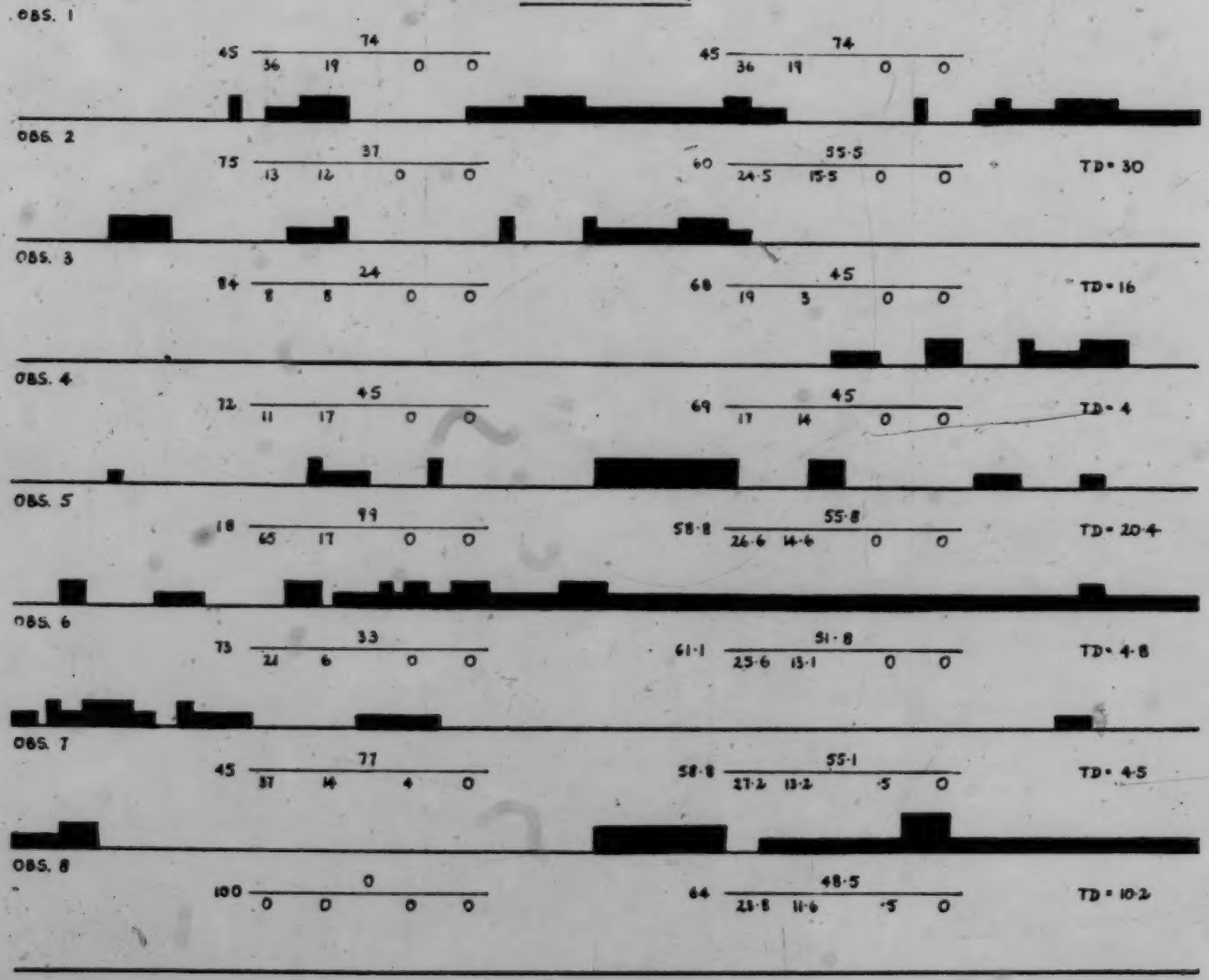
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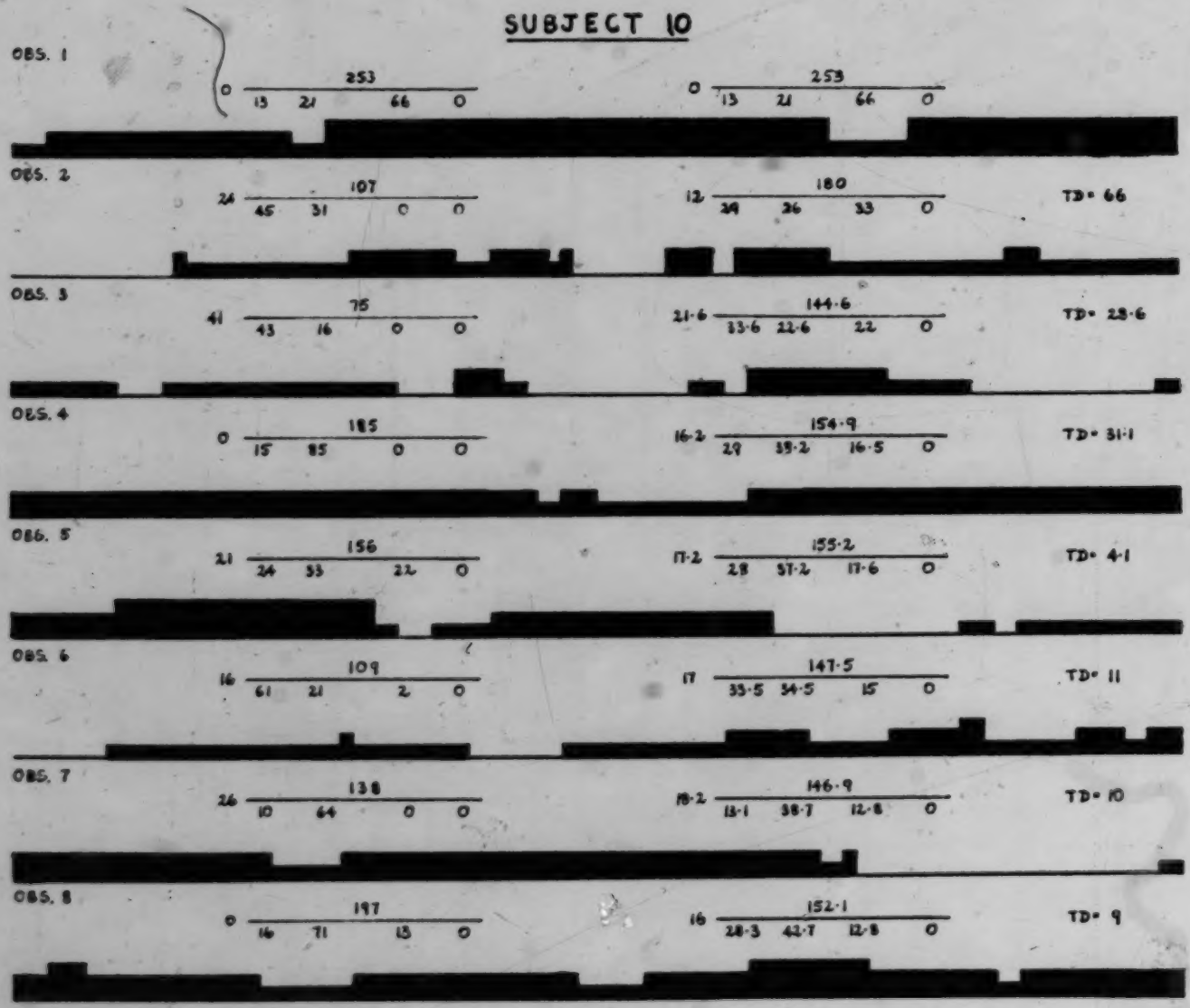
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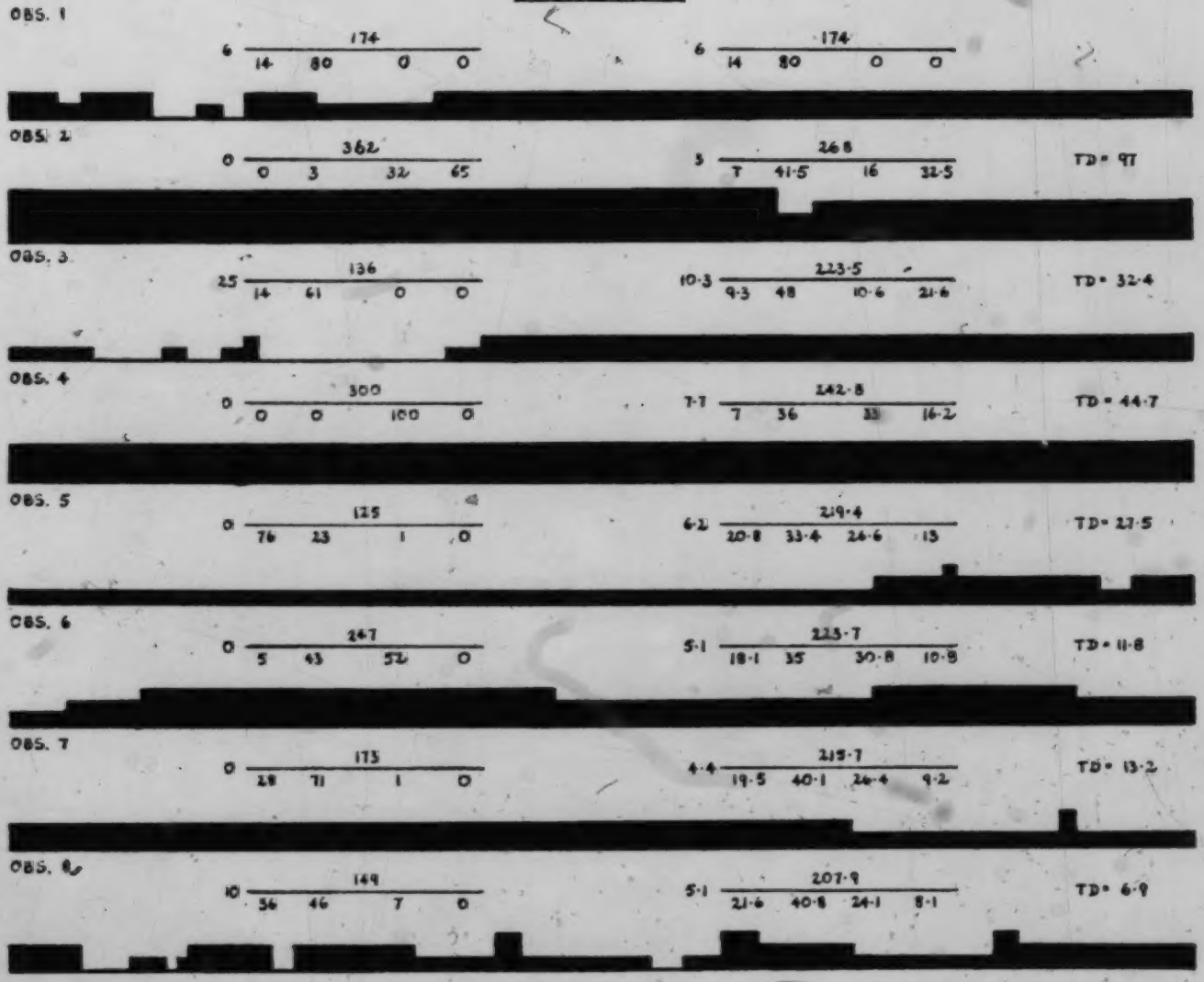
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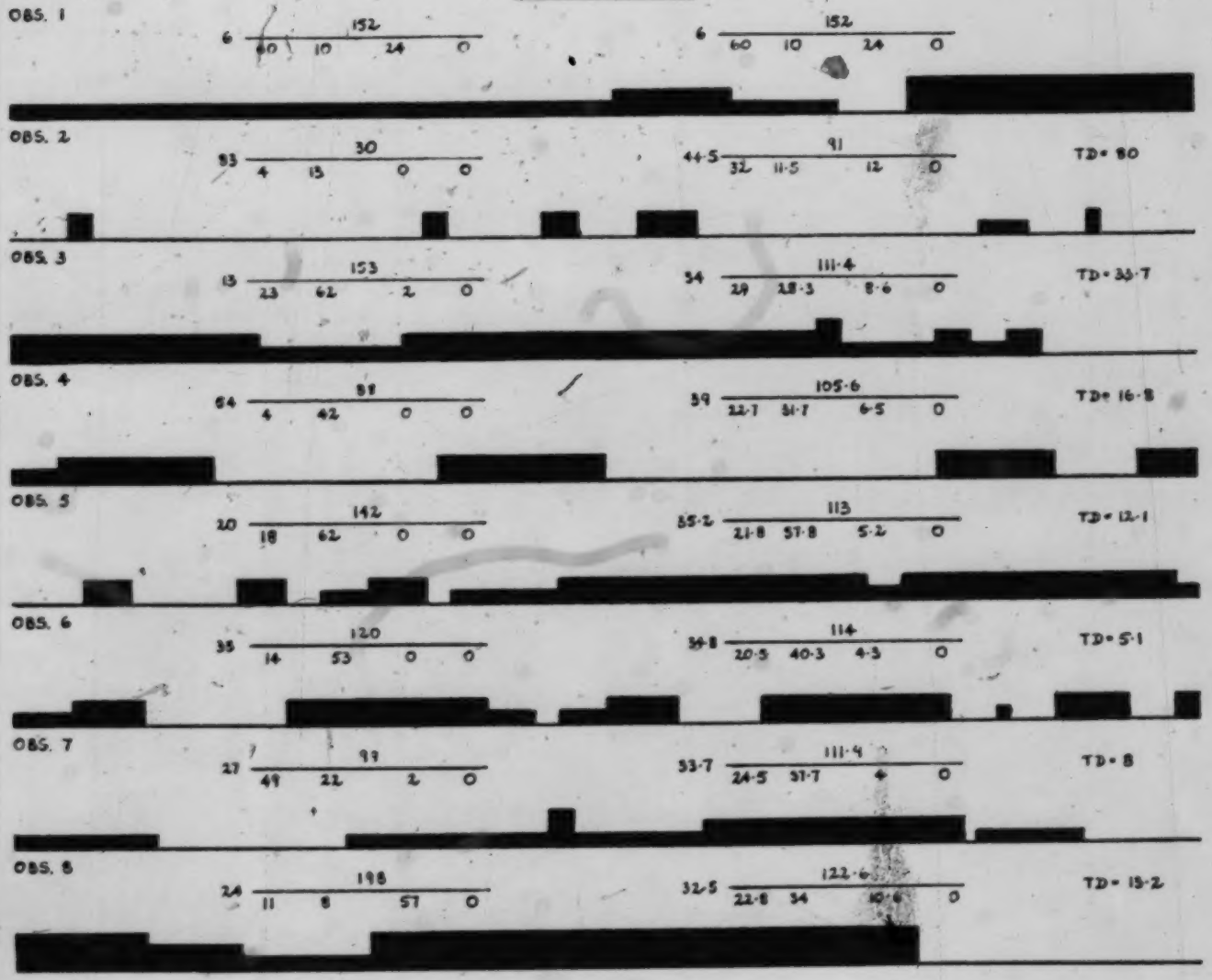
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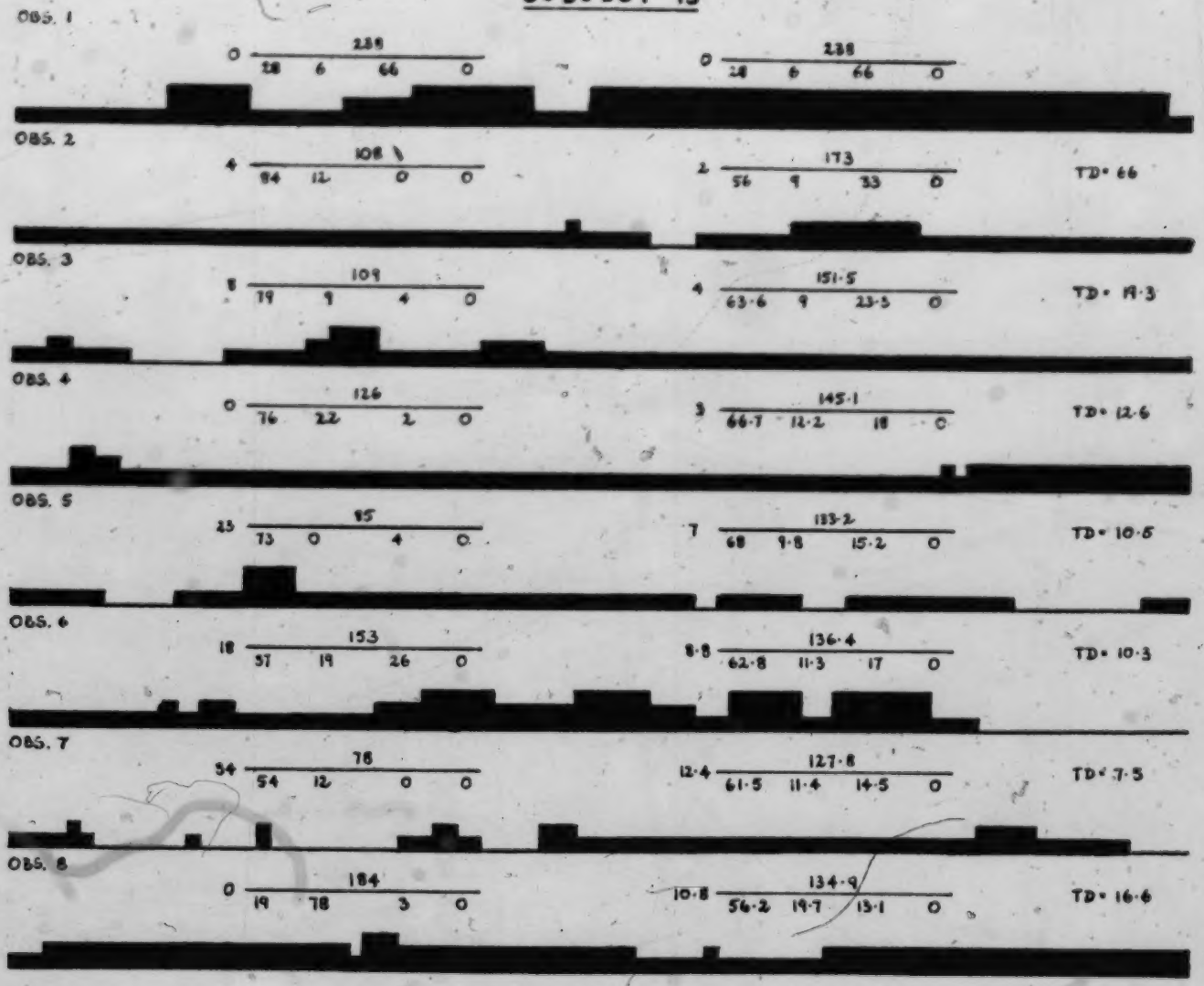
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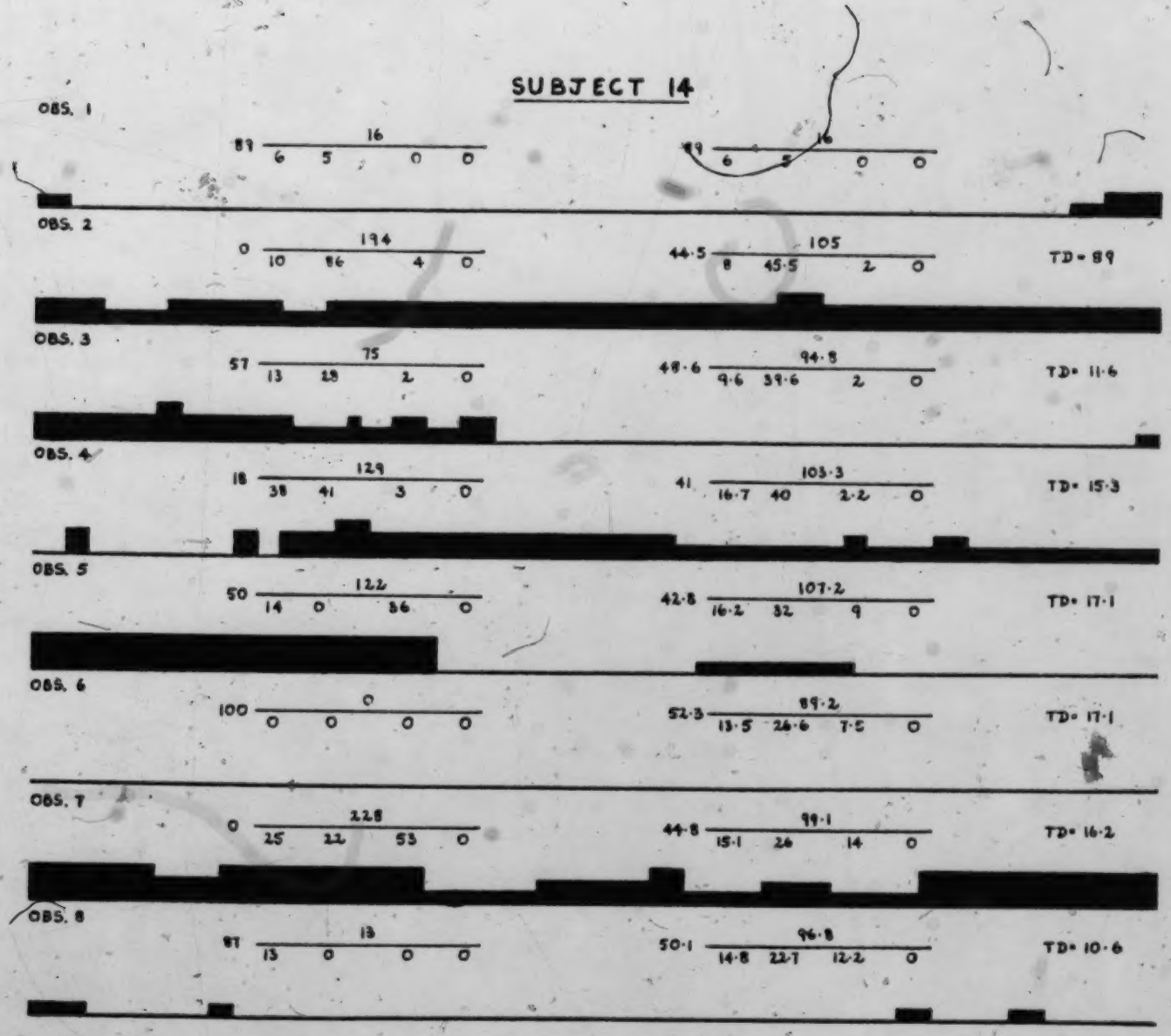
TD• 7·5
OBS. 8
0 184 19 78 3 0
10·8 134·9 56·2 19·7 13·1 0
TD• 16·6

SUBJECT 14


OBS. 1
89 16
6 5 0 0
89 16
6 5 0 0
OBS. 2
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10 86 4 0
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8 45·5 2 0
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OBS. 3
57 75
13 23 2 0
48·6 94·8
9·6 39·6 2 0
TD = 11·6
OBS. 4
18 129
38 41 3 0
41 103·3
16·7 40 2·2 0
TD = 15·3
OBS. 5
50 122
14 0 36 0
42·8 107·2
16·2 32 9 0
TD = 17·1
OBS. 6
100 0
0 0 0 0
52·3 89·2
13·5 24·6 7·2 0
TD = 17·1
OBS. 7
0 228
25 22 53 0
44·8 99·1
15·1 26 14 0
TD = 16·2
OBS. 8
87 13
13 0 0 0
50·1 96·8
14·8 22·7 12·2 0
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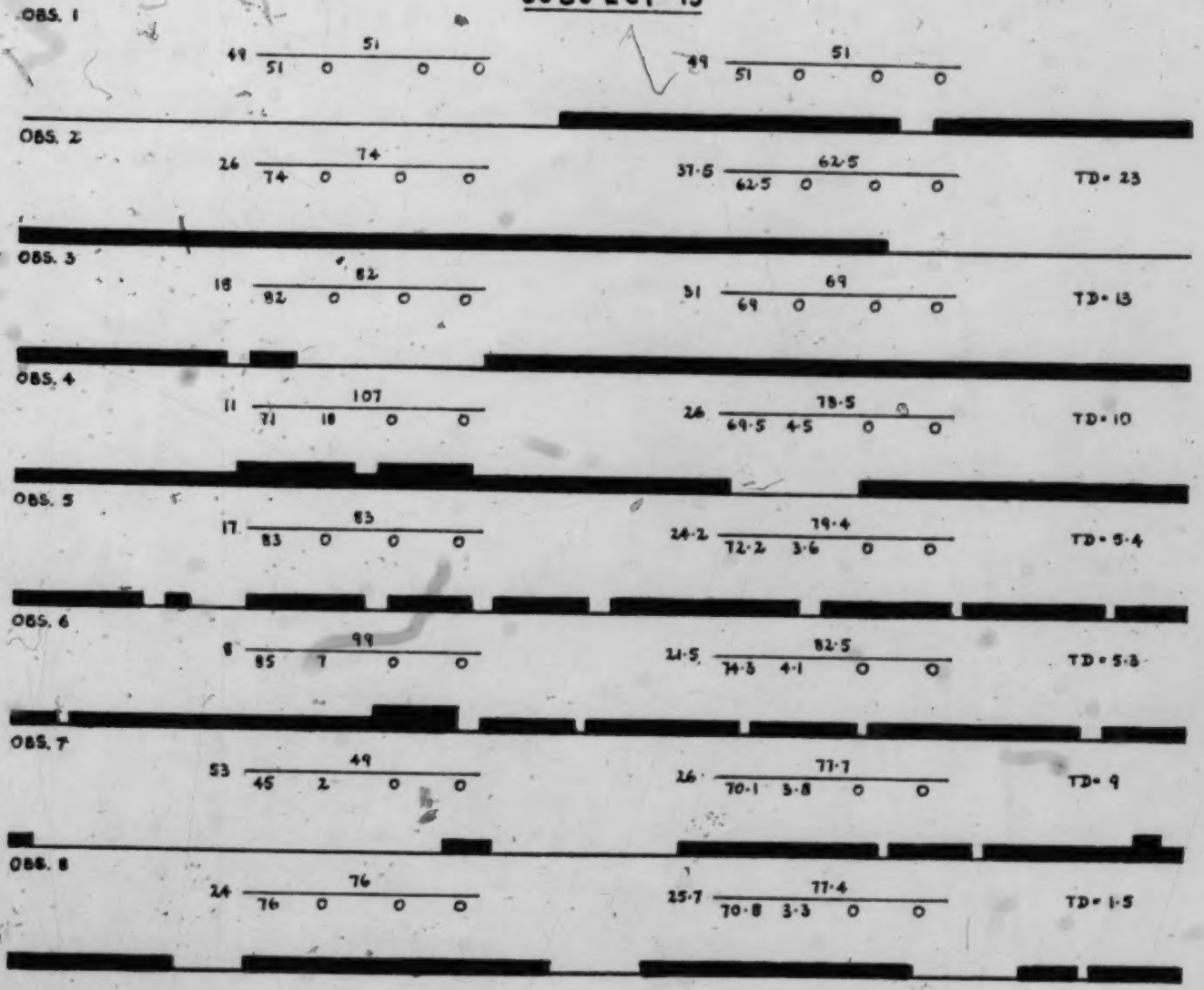
SUBJECT 15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37·5 62·5 62·5 0 0 0
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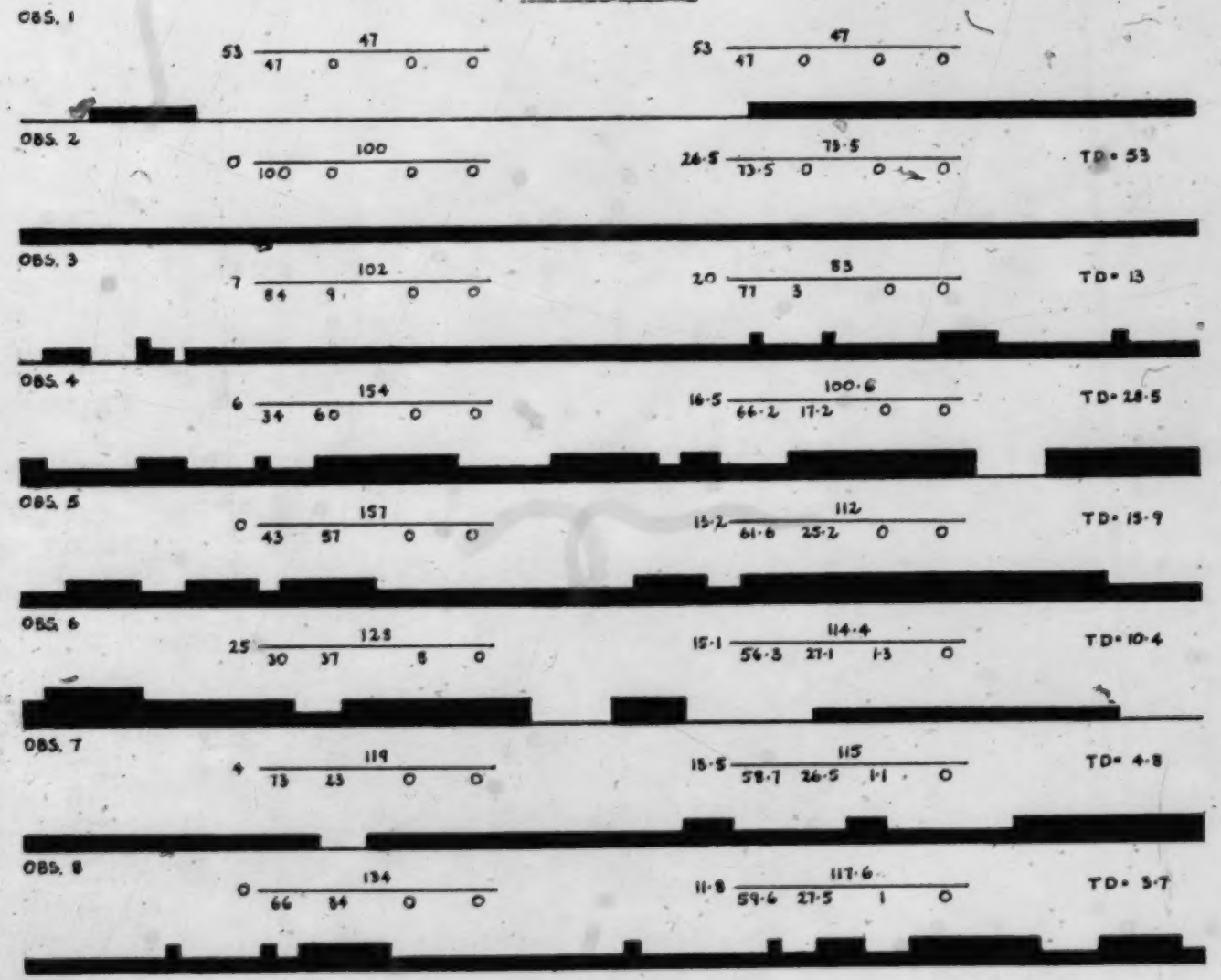
OBS. 3
18 82 82 0 0 0
31 69 69 0 0 0
TD = 13
OBS. 4
11 107 71 18 0 0
26 78·5 69·5 4·5 0 0
TD = 10
OBS. 5
17 83 83 0 0 0
24·2 79·4 72·2 3·6 0 0
TD = 5·4
OBS. 6
8 99 85 7 0 0
21·5 82·5 74·3 4·1 0 0
TD = 5·8
OBS. 7
53 49 45 2 0 0
26 77·7 70·1 3·8 0 0
TD = 9
OBS. 8
24 76 76 0 0 0
25·7 77·4 70·8 3·3 0 0
TD = 1·5

SUBJECT 16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47 0 0 0
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47 0 0 0
OBS. 2
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100 0 0 0
26·5 73·5
73·5 0 0 0
TD • 53
OBS. 3
7 102
84 9 0 0
20 83
77 3 0 0
TD • 13
OBS. 4
6 154
34 60 0 0
16·5 100·6
66·2 17·2 0 0
TD • 28·5
OBS. 5
0 157
43 57 0 0
13·2 112
61·6 25·2 0 0
TD • 15·9
OBS. 6
25 128
30 37 8 0
15·1 114·4
56·8 27·1 1·3 0
TD • 10·4
OBS. 7
4 119
73 43 0 0
15·5 115
58·7 26·5 1·1 0
TD • 4·8
OBS. 8
0 134
66 84 0 0
11·8 117·6
59·6 27·5 1 0
TD • 5·7

APPENDIX B

A MANUAL FOR TRAINING OBSERVERS IN THE USE OF AN INSTRUMENT FOR ASSESSING THE SENSORI-MOTOR PLAY OF PRE-SCHOOL TRAINABLE MENTALLY RETARDED CHILDREN

Introduction

This manual explains how the sensori-motor play of pre-school trainable mentally retarded children may be assessed in quantitative and qualitative terms, by analysing video-taped samples of his play behavior. It has been shown that a valid assessment can be obtained from eight 100 second video recordings, randomly taken during eight free play sessions.

The purpose and value of the assessment is based on the theses that play is a most important natural learning process, and that given a suitable play environment, the way a child chooses to spend his free time is highly relevant to his future development. For example, if a large proportion of this free time is spent in idle or seemingly stereotyped, purposeless pursuits, it stands to reason that development will be less than optimal. On the other hand, it is argued that the on-going development of a child's competence is assured for as long as he actively engages in a broad range of play behaviors revealing spontaneity in exploring the nature of the things in the play environment and the limits of his own physical capacities.

The instrument provides a sensitive and objective measure of the way the TMR child interacts with the play environment in which the observations were made, and at the same time, provides the assessor with information which points to the kind of play guidance the child needs.

Procedures for the use of the instrument

Step I Isolate the action units

Note: An action unit is a period of time during which the subject indulges in a particular kind of play. Play is defined as action on objects, including locomotor acts on one's own body as in

walking, jumping or climbing, but not introverted act like scratching, or mannerisms like shaking the hands.

1) Examine the 100 second video-taped recording of the subject's free play, listing the behavior (action units and non-play behavior) as it occurs. Include any change of posture with the behavior which immediately follows. For example, if the subject stands up and immediately walks, include the standing action within the walking action unit. Record any shift of attention as a new action unit. For example, if the subject is rolling a ball to a partner and he then holds the ball for a period to look elsewhere, record this as 2 separate action units -

"Rolls ball to partner

Holds ball"

2) Check the list and integrate where possible. For example, if the subject attends to emptying a basket by throwing out the individual items, integrate these individual acts as - "Empties basket"

Step II Determine the length of each action unit

This may be done by using a stop watch, or by dubbing a 100 second count on the video-tape.

Step III Rate all the behavior as follows:

Non play: No locomotion--except rocking action (stereotype).
No objects.
Not in a 'special' place.

Level I play: Locomotion--of the simplest forms eg. crawling, walking, shuffling, sliding.
- using play slide conventionally (seated)

Objects--holding; carrying; swinging; fiddling; sucking; but NOT attending. (non-purposeful.)
Looking in the mirror.
Being in a 'special' place eg. sitting in a car, in a play cube, on a scoot-board, being pulled or pushed in a car or on the plastic sheet.

Level II play: Locomotion--running; jumping; stepping up or down; walking up play slide; climbing onto platform; rolling in or on cylinder or bolster; using play slide with variations eg. head first.
Objects--any action on an object which appears to interest subject eg. banging, pushing, pulling, carrying.
Note: there is direct contact so that action produces immediate effect eg. riding a tricycle.
Carrying an object with intent (as opposed to non-purposeful wandering with an object--Level I)
- Throwing, without attending to effect produced.
Pushing; pulling; resisting another subject.
Swinging or hanging under apparatus, with or without feet on the ground.
Attention to clothing eg. taking off shoes.

Level III play: Locomotion--high skill eg. balance walk up plank, climbing ladder, running down slope, scoot-board down play slide.
Objects--propelling away, but maintaining interest; building or aligning objects; putting them in or taking

them out of a container; intensively examining, involving probing or shaking etc.; defending an object from another subject.

Level IV play: Definite evidence that an object represents something else under the action of the imagination i.e. symbolic or thematic play.

Special notes

Human behavior is so complex that it is difficult to list all possible action, even in generalized terms. In subjective decision-making, it should be remembered that the instrument's various play level are intended to be hierarchical in terms of the intellectual, attentional or motor sophistication required.

Action upon another person in order to achieve a goal is regarded as sophisticated behavior. Rate this kind of behavior at the level above that of the goal. For example, a subject pulls another child from a tricycle to ride it himself. Rate this action at Level III i.e. one above the normal for tricycling. The tricycling itself remains at Level II. However, such acts on others are never to be rated above Level III.

Acts of affection, such as hugging and patting may be regarded as Level II.

Step IV Express the data from each observation in the following form

$$A \quad \frac{B}{C : D : E : F}$$

Where A is the percentage of time spent in non-play

C is the percentage of time spent in Level I play

D is the percentage of time spent in Level II play

E is the percentage of time spent in Level III play

F is the percentage of time spent in Level IV play

and B is the play index, computed as follows

$1 \times C + 2 \times D + 3 \times E + 4F$

APPENDIX C

PLAY ASSESSMENT INSTRUCTIONS FOR JUDGES.

PLAY ASSESSMENT

May 1975.

From your knowledge of the Prep. children, independently locate them points for their normal free play participation, giving a maximum of 10 points for each of the 5 criteria used.

When making your assessment, try to ignore such factors as

:whether the play is sometimes social or anti-social.

:how intelligent you believe the child to be.

:how much untapped potential you feel the child has.

Criterion 1 relates to idleness in free play time. To what extent does the child spend his time purposefully? Rate fully-occupied as 10 points and completely idle as 0 points.

Criterion 2 relates to mobility i.e. the extent to which the child moves about the play area. Also does he/she move by different means (eg. walk, crawl, run, climb, slide, jump)?

Criterion 3 relates to the range of play experiences in which the child engages. Is the child limited to only 1 or 2 different play activities or has he/she a wide repertoire?

Criterion 4 relates to the quality or sophistication of the child's play as is seen, for example, in curiosity, exploration, creativity and imitation. Consider here too that play-things, including the child's own body, may be used in a simple or a complex manner. For example, a ball may be simply held, or it may be deliberately hit to a partner with a hockey stick. Also, play may provide immediate feedback (eg. beating a drum), while more complex play may involve extended time and space (eg. climbing along a ladder, or throwing a ball to a partner). Final-

ly, symbolic play or make-believe may be regarded as more sophisticated than sensori-motor activity.

Criterion 5 focuses on span of attention. Does the child persist with a particular kind of play, or is he/she easily distracted? Because some of the children seem to indulge in stereotype, self-stimulating and/or random, purposeless play over long periods, this criterion also incorporates your assessment of the depth of attention displayed in the child's characteristic play behavior.

Please return this assessment sheet within one week.

Assessor (tick one)

University staff

Class teacher

University student

Give 0 to 10 points for each of the following criteria

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Name of Subject	Degree of occupation	Mobility	Range of Play experiences	Quality of play	Attention span and depth